TWIN DISC
INCORPORATED

Service Manual

Marine Transmission

Components:
MG-**6557A**

Document Number: 1020**825**

NOTICE

Twin Disc, Incorporated makes no warranty or guaranty of any kind, expressed, implied or otherwise, with regard to the information contained within this manual. Twin Disc, Incorporated has developed this manual through research and testing of the information contained therein. Twin Disc, Incorporated assumes no responsibility for any errors that may appear in this manual and shall not be liable under any circumstances for incidental, consequential or punitive damages in connection with, or arising out of, the use of this manual. The information contained within this manual is subject to change without notice.

Document Number
1020825

April, 2004

Marine Transmission Service Manual

TWIN DISC, INCORPORATED
EXCLUSIVE LIMITED WARRANTY
COMMERCIAL MARINE TRANSMISSION

A. Twin Disc, Incorporated warrants all assembled products and parts, (except component products or parts on which written warranties issued by the respective manufacturers thereof are furnished to the original customer, as to which Twin Disc, Incorporated makes no warranty and assumes no liability) against defective materials or workmanship *for a period of twenty-four (24) months from the date of shipment by Twin Disc, Incorporated to original customer, but not to exceed twelve (12) months of service, whichever occurs first.* **This is the only warranty made by Twin Disc, Incorporated and is in lieu of any and all other warranties, express or implied, including the warranties of merchantability or fitness for a particular purpose and no other warranties are implied or intended to be given by Twin Disc, Incorporated.** The original customer does not rely upon any tests or inspections by Twin Disc, Incorporated or on Twin Disc, Incorporated*s application engineering.

B. **The exclusive remedy provided by Twin Disc, Incorporated whether arising out of warranty within the applicable warranty period as specified, or otherwise (including tort liability), shall at the sole option of Twin Disc, Incorporated be either the repair or replacement of any Twin Disc, Incorporated part or product found by Twin Disc, Incorporated to be defective and the labor to perform that work and to remove and reinstall (or equivalent credit). In this context, labor is defined as the flat rate labor hours established by Twin Disc, Incorporated in the published Twin Disc Flat Rate Schedule, required to remove, disassemble, inspect, repair, reassemble, reinstall and test the Twin Disc, Incorporated product only. Authorized reasonable travel and living expenses will be considered for payment. Under no circumstances, including a failure of the exclusive remedy, shall Twin Disc, Incorporated be liable for economic loss, consequential, incidental or punitive damages.** The above warranty and remedy are subject to the following terms and conditions:

1. Complete parts or products upon request must be returned transportation prepaid and also the claims submitted to Twin Disc, Incorporated within sixty (60) days after completion of the in-warranty repair.

2. The warranty is void if, in the opinion of Twin Disc, Incorporated, the failure of the part or product resulted from abuse, neglect, improper maintenance or accident.

3. The warranty is void if any modifications are made to any product or part without the prior written consent of Twin Disc, Incorporated.

4. The warranty is void unless the product or part is properly transported, stored and cared for from the date of shipment to the date placed in service.

5. The warranty is void unless the product or part is properly installed and maintained within the rated capacity of the product or part with installations properly engineered and in accordance with the practices, methods and instructions approved or provided by Twin Disc, Incorporated.

6. The warranty is void unless all required replacement parts or products are of Twin Disc origin or equal, and otherwise identical with components of the original equipment. Replacement parts or products not of Twin Disc origin are not warranted by Twin Disc, Incorporated.

C. As consideration for this warranty, the original customer and subsequent purchaser agree to indemnify and hold Twin Disc, Incorporated harmless from and against all and any loss, liability, damages or expenses for injury to persons or property, including without limitation, the original customer*s and subsequent purchaser*s employees and property, due to their acts or omissions or the acts or omissions of their agents, and employees in the installation, transportation, maintenance, use and operation of said equipment.

D. Only a Twin Disc, Incorporated authorized factory representative shall have authority to assume any cost or expense in the service, repair or replacement of any part or product within the warranty period, except when such cost or expense is authorized in advance in writing by Twin Disc, Incorporated.

E. Twin Disc, Incorporated reserves the right to improve the product through changes in design or materials without being obligated to incorporate such changes in products of prior manufacture. The original customer and subsequent purchasers will not use any such changes as evidence of insufficiency or inadequacy of prior designs or materials.

F. If failure occurs within the warranty period, and constitutes a breach of warranty, repair or replacement parts will be furnished on a no-charge basis and these parts will be covered by the remainder of the unexpired warranty which remains in effect on the complete unit.

TWIN DISC, INCORPORATED
FLAT RATE HOUR ALLOWANCE

(Hourly Labor Rate Must be Acceptable to Twin Disc, Incorporated.)

COMMERCIAL MARINE TRANSMISSIONS - ALL RATIOS:

MODEL SERIES	R&R	UNIT REBUILD	CLUTCH REPAIR (BOTH PACKS)
MG 502, MG 5010, MG5011, MG5005A MG5015A	10.0	8.0	-
MG 506, MG5061, MG 5050, MG5055A	10.0	11.0	-
MG 507, MG 5081, MG5085, MG5090,	10.0	12.0	-
MG 5091	10.0	12.0	4.0
MG5112,MG5113	10.0	17.0	-
MG 509, MG 5111, MG5114	10.0	17.0	4.0
MG5114A, MG5114RV	10.0	17.0	-
MG 514C, MG514M, MG5141, MG514CHP	10.0	25.0	6.0
MG 516, MG 5161	10.0	28.0	8.0
MG 518-1	10.0	32.0	10.0
MG520-1, MG 5202, MG5203, MG5204 MG5205	10.0	32.0	10.0
MG 530, MG530M, MG5301	12.0	32.0	16.0
MG 540	20.0	62.0	20.0
MG5600	20.0	62.0	20.0
MG6000	10.0	32.0	10.0
MGN80, MGN232, MGN233, MGN272, MGN273, MGN332, MGN334, MGN335, MGN432, MGN433, MGN472, MGN493	10.0	32.0	10.0
MGN650, MGN800,MGN1000,MGN1400, MGN1600	20.0	62.0	40.0
PUMP - ALL MODELS	1.0	-	
VALVE - ALL MODELS:	1.0	.5	

Table of Contents

Introduction 13
- General Information 13
- Safety and General Precautions 13
- Preventative Maintenance 15
- Towing 15
- Ordering Parts and Obtaining Services 16
- Source of Service Information 17
- Warranty 18

Description and Specifications 19
- General 19
- Power Ratings 20
- Construction Features 21
- Lubrication Features 22
- Specifications 24
- Optional Equipment 26
- Torque Values for Fasteners 28
- Clutch Plate Wear Limits 32

Operation 33
- General 33
- Hydraulic System with Electric Control Valve 34
- Trolling Valve (Optional) 44
- Power Take-off (Optional) 46
- Trailing Pump (Optional) 47
- Power Flow 48

Preventative Maintenance 53

Troubleshooting 59
- Troubleshooting Chart 59

Disassembly 63

Prepare Transmission for Disassembly 63
Component Identification 64
Drain Oil 65
Remove Transmission External Components 66
Torsional Coupling 66
Front Housing 66
Selector Valve and Oil Filter 67
Suction Strainer 68
Oil Pump 69
Heat Exchanger 70
Trailing Pump (if equipped) 73
Top Cover with Oil Baffle 73
Remove Primary and Secondary Clutch Shaft Assemblies 74
Remove Primary Clutch Shaft Rear Cover 74
Remove Pump Mount 75
Remove Manifold 77
Remove Primary and Secondary Clutch Shafts 79
Remove Input Drive Sleeve Assembly 80
Remove Output Shaft 83
Remove Transmission Bottom Cover 83
Remove Output Shaft 84
Remove Trailing Pump and Shaft 92
Remove Pump/Cover and Shaft 92
Bearing Removal 93
Other Components 94
Input Shaft Front Bearing Cup 95
Input Shaft Seal 95
Primary and Secondary Clutch Shaft, Output Shaft, and Ditch Plate Disassembly 96
Primary Clutch Shaft Disassembly 96
Secondary Clutch Shaft Disassembly 101
Primary and Secondary Clutch Shaft Insert Removal 103
Output Shaft Disassembly 104
Ditch Plate Disassembly 106
Disassembly of Upper Valve Body Half (Electric Section) 113
1017555 Trolling Valve (Optional Equipment) 115

Cleaning and Inspection 121

Cleaning 121
Inspection 123

Assembly 127

General 127
Primary Clutch Shaft Assembly 128
Secondary Clutch Shaft Assembly 136
Primary and Secondary Shaft Seal Ring Insert Installation 144
Ditch Plate Assembly 145
Trailing Pump Driven Gear Installation 146
Input Drive Sleeve and Shaft Seal 148
Output Shaft Installation 153
Output Shaft Bearing Adjustment 153
Assembling the Output Shaft Subassembly 156
Preliminary Output Shaft/Gear Advancement Verification 161
Gear Pan and Bottom Cover Installation 171
Install Clutch Shaft Assemblies 173
Prepare Clutch Shaft Assemblies 173
Installing Primary and Secondary Shafts 174
Install Manifold 176
Adjust Primary Shaft Bearing Clearance 178
Primary Shaft Cover Installation 179
Set Secondary Shaft Bearing Clearance 181
Pump Mount Installation 182
Transmission External Components 183
Pump and Suction Screen Installation 183
Trailing Pump and Governor Cover Installation 186
Heat Exchanger Installation 187
Assembly and Installation of Control Valve 192
Ditch Plate Installation 201
Oil Filter Housing Installation 202
Transmission Top Cover and Dip Stick Installation 203
Grease Output Shaft Seals 205
Front Housing Installation 206
Install Torsional Coupling and Fill Transmission with Oil 207

Installation 209

Prior to Installation 209
Alignment (also reference SAE J-1033 and J-617) 210
Installation 214

Special Tools 223

List of Special Tools 223
T-111145 Restraining Bar for Input Sleeve 225
T-111146 Driver, Output Shaft Bearing and Spacer 226
T-21482-06 Retention Block and Screw 227
T-21482-08 Hydraulic Knock-out Tool 228
T-21482-13 Locating Plate 229
T-21482-17 Trailing Pump Gear and Bearing Removal Tool 230
T-21482-20 Bearing Driver 231
T-21482-21 Restraining Tool, Output Shaft 232
T-21482-22 Shaft Support Tool 233
T-21482-23 Retainer, Input Drive Sleeve 234
T-21482-26 Bearing Driver 235
T-21482-30 Bearing Driver 236
T-21482-36 Input Oil Seal Carrier Puller 237
T-21482-39 Support Bracket (Leg) 238
T-21482-53 Primary Clutch End Play Fixture 239
T-21482-54 Secondary Clutch End Play Fixture 240
T-21578-1 Output Flange Installing Fixture (Sheet 3 of 3) 241
T-21578-4 Output Shaft Bearing Driver (Sheet 1 of 2) 242
T-21482 Output Gear Installing Tool 243
T-21482-02 Output Gear Ram 244
T-21482-40 Pump Bearing Pulling Tool (Sheet 1 of 3) 245
T-21482-40A Clutch Spring Compressing Tool (Sheet 2 of 3) 246
T-21482-40B Input Hub Removal Tool (Sheet 3 of 3) 247
T-21482-41 Seal Driver 248
T-21482-42 Bearing Driver 249
T-21482-43 Bearing Driver 250
T-21482-44 Adjustable Jack 251
T-21482-45 Bearing Driver 252
T-21482-46 Seal Driver 253

T-21482-47 Transfer Gear Installation Tool 254
T-21482-49 Bearing Cone Driver 255
T-21482-50 Clutch Alignment Tool 256
T-21482-51 Primary Clutch Cover 257
T-21482-52 Secondary Clutch Cover 258

Engineering Drawings 259

List of Engineering Drawings 260
736628 Marine Transmission, General View 261
736628A Marine Transmission, General View 262
738228B Marine Transmission, General View 263
738229 Marine Transmission, Sectional View 264
737634 Marine Transmission, General View 265
737635 Marine Transmission, Sectional View 266
737934A Marine Transmission, General View 267
737265A Marine Transmission, General View 268
737266 Marine Transmission, Sectional View 269
737893 Marine Transmission, General View 270
737894 Marine Transmission, Sectional View 271
549341 Marine Transmission, Sectional View 272
737966 Marine Transmission, Sectional View 273
A7119W Hydraulic Diagram, Electric Valve 274
349460 Hydraulic Schematic, Transmission 275
1018084 Valve Assembly - Control (without trolling valve) 276
1020025 Valve Assembly, Trolling 277
168753G Valve Assembly, Trolling 278
549091 Pump Assembly (trailing) 279
737004A Live Pump Mount Power Take-off 280
737064B Clutchable Pump Mount Power Take-off 281

NOTES

Introduction

General Information

This publication provides service information for the Twin Disc MG-6557A marine transmission. Specific engineering details and performance characteristics can be obtained from the Product Service Department of Twin Disc, Incorporated, Racine, Wisconsin, USA.

Operation and maintenance personnel responsible for this equipment should be familiar with this publication and have it at their disposal. A thorough understanding and application of the material in this manual will result in consistent performance from the unit and help reduce downtime.

Safety and General Precautions

General

All personnel servicing this equipment should employ safe operating practices. Twin Disc, Inc. will not be responsible for personal injury resulting from careless use of hand tools, lifting equipment, power tools, or unacceptable maintenance/working practices.

Important Safety Notice

Proper installation, maintenance, and operation procedures must be followed due to the possible danger to person(s) or property from accidents that may result from the use of machinery. Twin Disc, Inc. will not be responsible for personal injury resulting from careless maintenance/working practices.

Inspect as necessary to assure safe operations under prevailing conditions. Proper guards and other safety devices that may be specified in safety codes should be provided. These devices are neither provided by, nor are they the responsibility of Twin Disc, Inc.

⚠ WARNING

Selecting NEUTRAL disengages transmission clutches but does not prevent propeller shaft rotation. If you require positive neutral (propeller shaft locked), a shaft brake or other shaft-locking device must be used.

⚠ WARNING

To prevent accidental starting of the engine when performing routine transmission maintenance, disconnect the battery cables from the battery and remove ignition key from the switch.

⚠ WARNING

Most Twin Disc products have provisions for attaching lifting bolts. The holes provided are always of adequate size and number to safely lift the Twin Disc product. These lifting points must not be used to lift the complete power unit. Lifting excessive loads at these points could cause failure at the lift point (or points) and result in damage or personal injury.

⚠ CAUTION

Select lifting eyebolts to obtain maximum thread engagement with bolt shoulder tight against housing. Bolts should be near but should not contact bottom of bolt hole.

Preventative Maintenance

The Preventative Maintenance section of this manual provides schedules for recommended maintenance of the equipment.

Towing

⚠ WARNING

Under the conditions described below, the propeller shaft must be locked in place to prevent backdriving, or an optional trailing pump must be added. Failure to do this can damage the marine transmission due to the lack of component lubrication.

Backdriving (also called windmilling) occurs when an engine is shut down and the propeller shaft is being driven by the flow of water across the propeller, which, in turn, rotates the components in the marine transmission. During backdriving conditions, the transmission does not receive proper lubrication.

Conditions where backdriving may occur:

- ❑ Vessel is being towed.
- ❑ One or more engines on a multiple-transmission vessel are shut down while under way.
- ❑ Sailboat under sail with auxiliary engine shut down.
- ❑ Vessel tied up or docked in a heavy current.

The following solutions are applicable for all MG-6557A transmissions when any of the above conditions are present:

- ❑ Lock the propeller shaft to prevent rotation.
- ❑ Add an optional trailing oil pump into the lubrication circuit.

Refer to the hydraulic system schematics for more details on the optional trailing pump specifications for the applicable transmission, or contact your Twin Disc Authorized Distributor.

Ordering Parts and Obtaining Services

⚠ WARNING

All replacement parts or products (including hoses and fittings) must be of Twin Disc origin or equal, and otherwise identical with components of the original equipment. Use of any other parts or products will void the warranty and may result in malfunction or accident, causing injury to personnel and/or serious damage to the equipment.

Ordering Service Parts

Renewal parts, service parts kits, optional equipment and product service assistance may be obtained from any authorized Twin Disc distributor or service dealer. Contact Twin Disc for the distributor or service dealer near you.

Note: Do not order parts using the part numbers on the cross-sectional drawings. These numbers may be referenced for part identification; however, they should be verified on the bill of material (BOM) before an order is placed. BOM numbers are stamped on the unit nameplate.

Twin Disc, having stipulated the bill of material number on the unit's nameplate, absolves itself of any responsibility resulting from any external, internal, or installation changes made in the field without the express written approval of Twin Disc. All returned parts, new or old, resulting from any of the above stated changes will not be accepted for credit. Furthermore, any equipment that has been subjected to such changes will not be covered by a Twin Disc warranty.

Source of Service Information

For the latest service information on Twin Disc products, contact any Twin Disc distributor or service dealer. This can be done on the Twin Disc corporate web site found at [http://www.twindisc.com]. Provide your model number, serial number, and bill of material number to obtain information on your unit. If necessary, contact the Product Service Department, Twin Disc, Incorporated, Racine, Wisconsin 53405-3698, USA by e-mail at service@twindisc.com.

Warranty

Equipment written about in this manual has a limited warranty. For details of the warranty, refer to the warranty statement at the front of this manual or contact any Twin Disc Authorized Distributor, service dealer, or the Warranty Administration Department, Twin Disc, Inc., Racine, Wisconsin, U.S.A.

Description and Specifications

General

Drawings that identify installation information for the MG-6557A marine transmission are located at the end of this manual. This unit is only available as an engine mounted unit that attaches directly to the engine flywheel housing. The output shaft is 10 degrees down angle to the input shaft.

Nameplate

The nameplate identifies the model, bill of material (BOM) and the serial number of the unit. These numbers are necessary to identify the correct parts for your transmission.

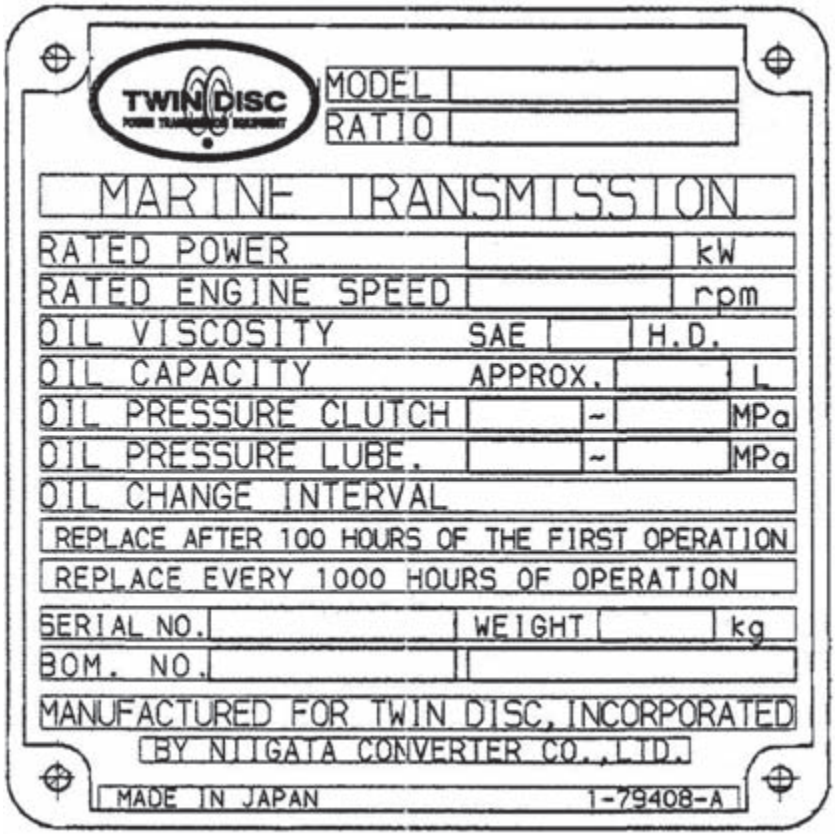


Figure 1. Nameplate for MG-6557A Marine Transmission

Power Ratings

The MG-6557A transmissions can be operated through either the primary shaft or secondary shaft at its full rated horsepower when driven by a standard right hand rotation engine (counterclockwise flywheel rotation when viewing rear of engine). This series of marine transmissions can be driven by a left hand rotation engine. Contact an authorized Twin Disc distributor for more information.

Transmission clutches are hydraulically applied using main oil pressure. All bearings, clutches and gears are lubricated and cooled with low pressure oil.

Always reference the Bill of Materials (BOM) or Specification number when ordering service parts.

Construction Features

Housings

The MG-6557A series transmission has a one piece main housing. Front housings in sizes SAE No. 1 and SAE No. 0 are available. A top cover, a bottom cover, and a manifold complete the housing enclosure. The pump mounts on the secondary shaft, and the primary shaft has a cover.

Bearings

The primary and secondary clutch shafts are supported and located by tapered roller bearings. The pinions are supported on bushings and the end movement limited by thrust washers. Bearing clearances for each clutch shaft are set by using a single shim pack at the rear tapered roller bearing on each shaft. Tapered roller bearings and a spherical roller bearing support the output shaft and have bearing clearance adjusted by using shims at the rear bearing retainer.

Oil Pump and Drive

The oil pump is spline driven by the secondary clutch shaft.

Lubrication Features

The MG-6557A transmission bearings and clutches on the primary and secondary shafts are lubricated through oil passages drilled in the shafts. The output shaft bearings, transfer gears, primary and secondary pinions and their bearings are gravity and splash lubricated.

Suction Screen

The marine transmission has a serviceable suction strainer located below the oil pump. The strainer is between the sump and oil pump in the hydraulic circuit. The strainer can be replaced if necessary.

Filter Assembly

A canister style filter is located between the oil pump outlet and the selector valve in the hydraulic circuit. The replacement element should be replaced at 1000 hour or six month intervals, whichever comes first. The replacement filter part number is N144200000.

Gears

All gears are helical, carburized, hardened and skived or ground for smooth quiet operation. All gears are in constant mesh. The primary and secondary transfer gears/clutch spiders are shrunk-fit onto the primary and secondary shafts. Do not remove these gears during service. The output gear is mounted on a keyless taper.

Flexible Torsional Input Coupling

The purpose of the torsional coupling is to transmit power from the engine to the marine transmission through a rubber or silicone element that will:

- ❑ Dampen torsional vibrations.
- ❑ Change the natural frequencies of a system to move critical frequencies out of the operating speed range.
- ❑ Accommodate a certain amount of misalignment.
- ❑ Absorb shock and reduce noise.
- ❑ Minimize gear “rattle.”

The coupling has been selected based on the customer supplied engine information. Final coupling selection must be confirmed by the packager based on the torque/rpm ratings and the results of the system torsional vibration analysis (TVA), and on engine rotation. Care must be taken when servicing that replacement couplings are matched to this criteria.

Heat Exchanger

The heat exchanger is designed to maintain the oil in the hydraulic system of the marine transmission at the proper temperature by passing raw or fresh water through the heat exchanger. The heat exchanger is located in the transmission housing. Replaceable zincs for corrosion protection are located on the heat exchanger rear and front end caps.

Specifications

Maximum operating speed: 2500 rpm

Operating oil sump temperature: 65 - 70°C (149 - 158°F) when using SAE 40 oil

Oil type and viscosity: See nameplate below

Oil capacity: 20 liters (5.3 gal)

Approximate dry weight: 415 kg (915 lb)

Oil pressure: See Tables 1. Oil temperature to be in normal operating range.

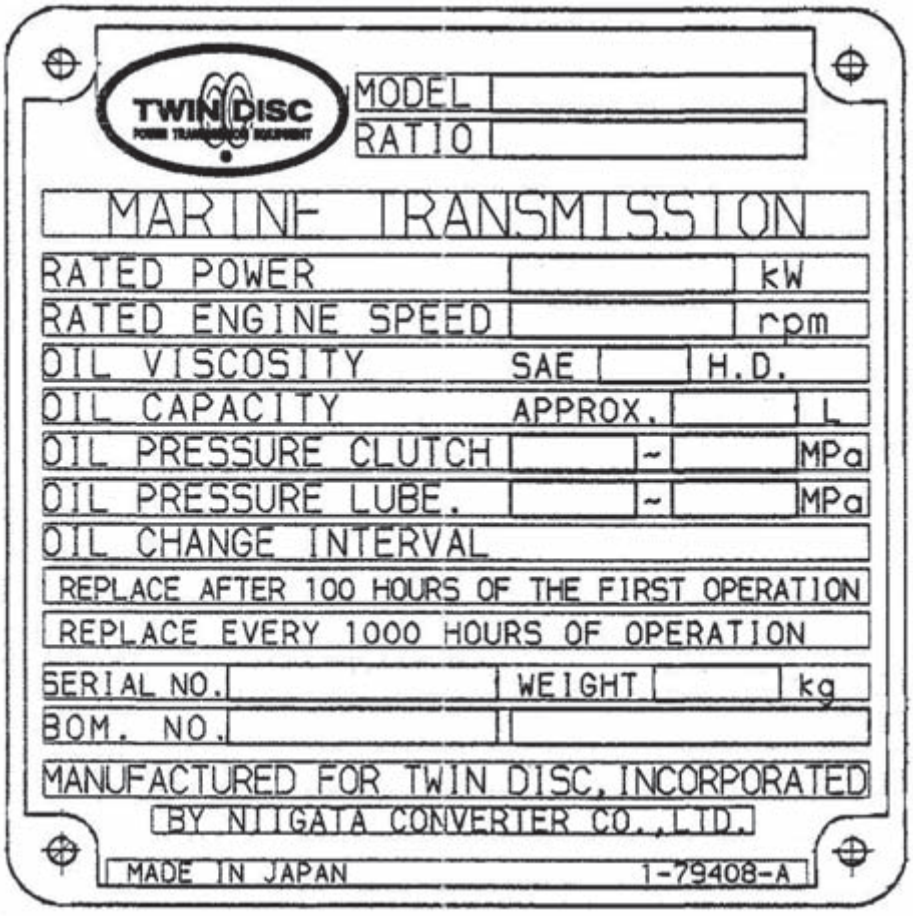


Figure 2. Nameplate with Oil Specification

Table 1. 2351-2551 kPa (341-370 psi) Transmission Oil Pressure Specifications

Mechanical Valve - 2454 - 2648 kPa (356 - 384 psi) Springs									
Input Speed	Shift Position	Main Pressure at Valve Inlet		Primary Clutch Min.		Secondary Clutch Min.		Lube	
		kPa	psi	kPa	psi	kPa	psi	kPa	psi
600	Neutral	255-310	37-45	0	0	0	0	19 min	2.8 min
600	Primary	786-2648	114-384	786	114	0	0	19 min	2.8 min
600	Secondary	786-2648	114-384	0	0	786	114	19 min	2.8 min
2100	Neutral	490-1179	71-171	0	0	0	0	193-689	28-100
2100	Primary	2454-2648	356-384	2351	341	0	0	193-586	28-85
2100	Secondary	2454-2648	356-384	0	0	2351	341	193-586	28-85

Note: It is required that primary and secondary clutches must be within 97 kPa (14 psi) of each other.

Note: Some early production units operated with lower oil pressures. The following table applies to these units only.

Table 2. 2255-2455 kPa (327-356 psi) Transmission Oil Pressure Specifications

Mechanical Valve - 2255 - 2455 kPa (327 - 356 psi) Springs									
Input Speed	Shift Position	Main Pressure at Valve Inlet		Primary Clutch Min.		Secondary Clutch Min.		Lube	
		kPa	psi	kPa	psi	kPa	psi	kPa	psi
600	Neutral	255-310	37-45	0	0	0	0	2.8 min	19 min
600	Primary	786-2455	114-356	2255	327	0	0	2.8 min	19 min
600	Secondary	1660-1790	240-260	0	0	786	114	2.8 min	19 min
2100	Neutral	490-1179	71-171	0	0	0	0	193-689	28-100
2100	Primary	2255-2455	327-356	2255	327	0	0	193-586	28-85
2100	Secondary	2255-2455	327-356	0	0	2255	327	193-586	28-85

Optional Equipment

The following optional equipment for use with the model MG-6557A is available through the nearest authorized Twin Disc distributor.

Optional Trailing Pump

A trailing pump kit is available that bolts onto the rear of the marine transmission. A drawing is included in the Engineering Drawings.

Power Take-off

A live Pump Mount power take-off and a hydraulically clutchable power take-off are available and mount on the rear of the transmission. They rotate at the same speed and direction as the engine.

Mounting Brackets

Fabricated mounting brackets are available.

Torsional Input Coupling

Several models of torsional input couplings are available.

Electric Control Valve

The electric control valve is standard with either 12 vdc or 24 vdc actuating solenoids.

Coupling Flange

A coupling companion flange is available.

Trolling Valve

A mechanical trolling valve is available for mounting on the electric control valve. The part number is 1020025.

Table 3. Bearing End Play Specifications

Transmission Primary and Secondary Shaft Tapered Roller Bearing Endplay		
Assembly No.	**Minimum**	**Maximum**
All	-0.05 mm (-0.002 in)	+0.05 mm (+0.002 in)
Transmission Output Shaft Bearing Endplay		
Assembly No.	**Minimum**	**Maximum**
All	0.00 mm (.000 in)	+0.05 mm (+0.002 in)

Note: A negative endplay indicates a pre-load condition.

Table 4. Front Housing and Output Flange Runout Limits

Feature	Maximum allowable total indicator reading
SAE #1 front housing face	0.30 mm (.012 in)
SAE #0 front housing face	0.41 mm (.016 in)
SAE #1 front housing pilot diameter	*0.30 mm (.012 in)
SAE #0 front housing pilot diameter	*0.41 mm (.016 in)
Output flange face near O.D.	0.10 mm (.004 in)
Output flange pilot diameter	0.10 mm (.004 in)
*This note applies to a continous 270° arc if the balance of the pilot is negative in readings; otherwise it means all 360°.	

Torque Values for Fasteners

Note: Lubricate all threads and bearing face with light oil film prior to assembly.

Table 5. Metric Coarse Thread Capscrews, Bolts, and Nuts

Thread Size	Property Class 8.8		Property Class 10.9		Property Class 12.9	
	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
M6	6.5 - 7.5	9 - 10	9 - 10	12 - 14	10 - 12	14 - 16
M8	16 - 18	21 - 25	23 - 26	31 - 35	25 - 29	34 - 40
M10	32 - 36	43 - 49	44 - 51	60 - 68	51 - 59	70 - 80
M12	55 - 63	74 - 86	77 - 88	104 - 120	89 - 103	121 - 139
M16	132 - 151	179 - 205	189 - 217	256 - 294	219 - 253	298 - 342
M20	257 - 295	348 - 400	364 - 418	493 - 567	429 - 493	581 - 669
M24	445 - 511	603 - 693	626 - 720	848 - 976	737 - 848	1000 - 1150
M30	714 - 820	987 - 1113	1235 - 1421	1674 - 1926	1475 - 1697	2000 - 2301

Table 6. Metric Stainless Steel Capscrews, Bolts, and Nuts

Note: The use of nickel anti-seize compound is required to prevent corrosion due to galvanic action. Apply nickel anti-seize compound to the threads of these stainless steel fasteners before torquing to specification. See Standard Sheet S574B for a more complete listing of stainless steel fastener torque values.

Metric Coarse Thread Stainless Steel Capscrews, Bolts, and Nuts	
Thread Size	**Recommended Torque N-m (Lb$_f$-ft)**
M8	12 (8.5)
M10	24 (18)
M12	40 (30)
M14	63 (46)
M16	97 (72)

T-17

Table 7. Tapered Pipe Plugs (with thread lubricant)

Torque Values for Lubricated Pipe Plugs Recommended Torque in N-m (Lbf-ft)			
PT Size	**NPTF** Size	**Installed in Cast Iron or Steel**	**Installed in Aluminum**
1/16 - 28	1/16 - 27	11.5 ± 1.3 (8.5 ± 1.0)	7.5±0.9 (5.5±0.7)
1/8 - 28	1/8 - 27	14.2 ± 1.8 (10.5 ± 1.3)	8.8 ± 1.1 (6.5 ± 0.8)
1/4 - 19	1/4 - 18	34 ± 4 (25 ± 3)	22 ± 3 (16 ± 2)
3/8 - 19	3/8 - 18	37 ± 4 (27 ± 3)	23 ± 3 (17 ± 2)
1/2 - 14	1/2 - 14	68 ± 8 (50 ± 6)	41 ± 5 (30 ± 4)
3/4 - 14	3/4 - 14	73 ± 10 (54 ± 7)	46 ± 5 (34 ± 4)
1 - 11	1 - 11-1/2	109 ± 13 (80 ± 10)	68 ± 8 (50 ± 6)
1-1/4 - 11	1-1/4 - 11-1/2	115 ± 13 (85 ± 10)	75 ± 9 (55 ± 7)
1-1/2 - 11	1-1/2 - 11-1/2	115 ± 13 (85 ± 10)	75 ± 9 (55 ± 7)

Notes:

The lubricant is to be John Crane insoluble plastic lead seal No. 2 (or equivalent), or Loctite® No. 92 (or equivalent) and plugs are to be capable of removal without damage. Overtightening may cause initial leakage, plus potential removal damage.

An option of a maximum of two full turns after finger tightening the plug may be used if required and if removal conditions are met.

T-12

Table 8. Straight Threaded Tube Fittings, Hose Fittings, and O-ring Plugs

Nominal Thread Diameter	Nm + or - 5 %	lb-ft + or - 5 %	Nominal Thread Diameter	Nm + or - 5 %	lb-ft + or - 5 %
5/16	5	3.5	1 5/8	108	80
3/8	11.5	8.5	1 7/8	108	80
7/16	16	12	2 1/2	108	80
1/2	20	15	M10X1.0	12	9
9/16	24	18	M12X1.5	16	12
5/8	24	18	M14X1.5	20	15
11/16	34	25	M16X1.5	24	18
7/8	54	40	M18X1.5	34	25
1 1/16	75	55	M22X1.5	54	40
1 3/16	88	65	M27X2.0	75	55
1 1/4	88	65	M33X2.0	88	65
1 5/16	108	80	M42X2.0	108	80
1 3/8	108	80	M48X2.0	108	80

Table 9. Tubing Nuts

Torque Values for Tubing Nuts	
Nominal Tube Size	**Recommended Torque N-m (Lb$_{ft}$-ft)**
8 mm	39 (29)
10 mm	52 (38)
12 mm	62 (46)
15 mm	103 (76)
21.7 mm	118 (87)

T-13

Table 10. Banjo Fittings & Sealing Plugs with Copper Washers

Torque Values for Banjo Fittings & Sealing Plugs with Copper Washers	
Thread Size	**Recommended Torque N-m (Lb$_{ft}$-ft)**
M14 x 1.5	64 (47)
M16 x 1.5	83 (61)
M24 x 1.5	186 (137)

T-16

Clutch Plate Wear Limits

Clutch steel plates:

Minimum thickness: 2.10 mm (0.083 in.)

Clutch friction plates:

Minimum thickness: 3.15 mm (0.124 in.)

Operation

General

The control valve obtains primary, neutral and secondary positions. When these positions are selected, the control valve directs high pressure oil through internal passages to operate the clutches. The pressure-rate control piston within the control valve assembly provides a rapid, smooth oil pressure increase in the hydraulic system during clutch engagement.

Hydraulic System with Electric Control Valve

The oil pump draws oil through the strainer from the oil sump and discharges it through the oil filter. Filtered oil enters the control valve through the inlet port. The incoming oil forces the pressure regulator piston against the springs to open the path to the lubrication circuit. Oil not used for clutch engagement flows past the regulator piston to become lubrication oil. Lubrication oil flows through the heat exchanger to the lubrication oil circuit in the transmission to lubricate and cool the clutches and bearings. There is a lubrication oil pressure relief valve to limit maximum lubrication oil pressure to approximately 690 kPa (100 psi).

In Neutral, the inlet port of both clutches is connected to the atmosphere. Since the area behind the clutch pistons is open to sump, the clutches are disengaged. Oil is distributed through the lubrication system. The area between the pressure regulating piston and the rate-of-rise piston is connected to sump at all times to prevent any leaking oil from affecting the pressure regulation.

The pressure in the rate-of-rise chamber is controlled by a ball that is spring loaded against the orifice plate. The passage behind the ball and spring is connected to sump (atmosphere) in Neutral and to main pressure when either clutch is engaged. A shuttle ball, connected to both clutch pressure ports, permits pressurizing this passage with oil from the engaged clutch without allowing oil to flow to the disengaged clutch.

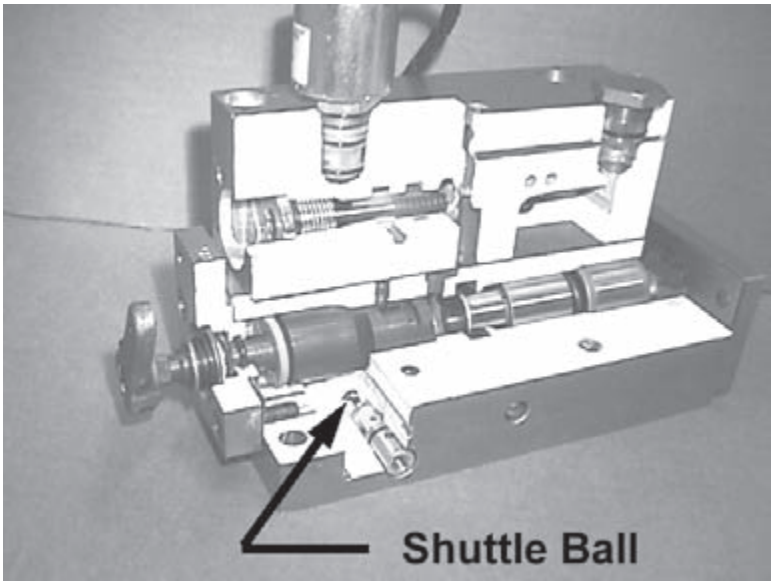


Figure 3. Location of Shuttle Ball

The electric control valve can be used in a manual override mode in the event of an electrical power failure.

When the control valve is energized or shifted to engage either clutch, the valve directs main pressure to engage the selected clutch pack. Oil is also directed to move the rate-of-rise piston, compressing the pressure regulator springs. This progressively increases the clutch engaging pressure causing the clutches to engage at a controlled rate.

The control valve allows only one clutch to be engaged at a time, and the oil from the disengaged clutch is vented to sump (atmospheric pressure). The clutch return springs move the disengaged clutch's piston to the disengaged position minimizing clutch plate drag.

Control Valve Assembly in Neutral

Some of the main pressure oil from the oil inlet chamber flows through a passage to the orifice in the orifice plate. The small flow of oil through this orifice fills and begins to pressurize the rate-of-rise chamber.

Both clutches are connected to sump when the control valve is in Neutral. Since there is no pressure acting on the shuttle ball from either clutch, the passage behind the ball and spring regulator is also connected to sump. This allows the oil pressure in the rate-of-rise chamber to be regulated by the ball and spring, since the overage oil can flow to sump. The oil pressure in the rate-of-rise chamber acting on the rate-of-rise piston causes it to stroke over partially, which compresses the pressure regulating springs.

This additional spring compression further resists the movement of the pressure regulating piston, resulting in a force balance between the area at the pressure regulator, the springs, and the area behind the rate-of-rise piston. Neutral main pressure of approximately 40 psi is maintained by relieving excess oil behind the rate-of rise piston through the ball and spring regulator.

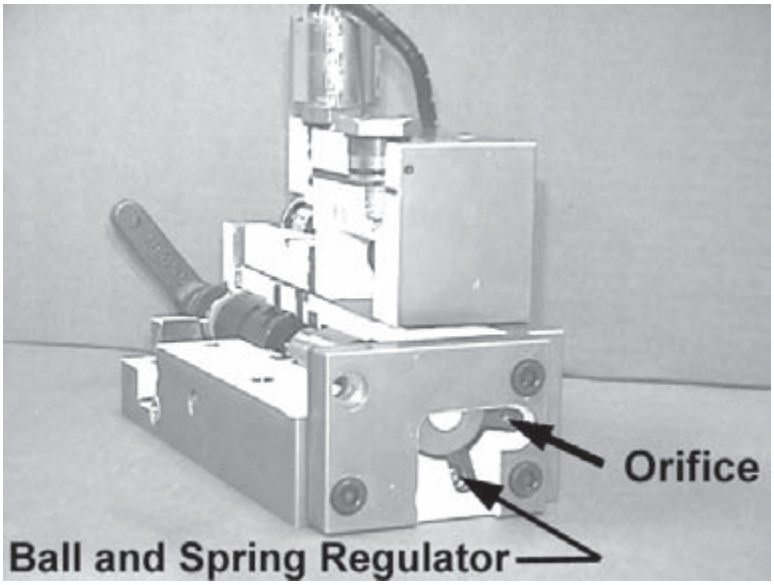


Figure 4. Neutral Regulator and Rate of Rise Orifice

Control Valve Assembly in Primary or Secondary

Pressurized oil is directed to one of the transmission's clutches to engage it. The pressurized oil in the clutch port of the engaged clutch acts on the shuttle ball, sealing off the passage to the opposite clutch. The pressurized oil also forces the ball of the ball and spring regulator against its seat on the orifice plate, stopping the flow of oil from the rate-of-rise chamber to sump. Since oil continues to flow into the rate-of-rise chamber through the orifice, the oil pressure in the rate-of-rise chamber increases. This increased oil pressure forces the rate-of-rise piston to stroke over to its stop in the valve body, compressing the pressure regulating springs even more.

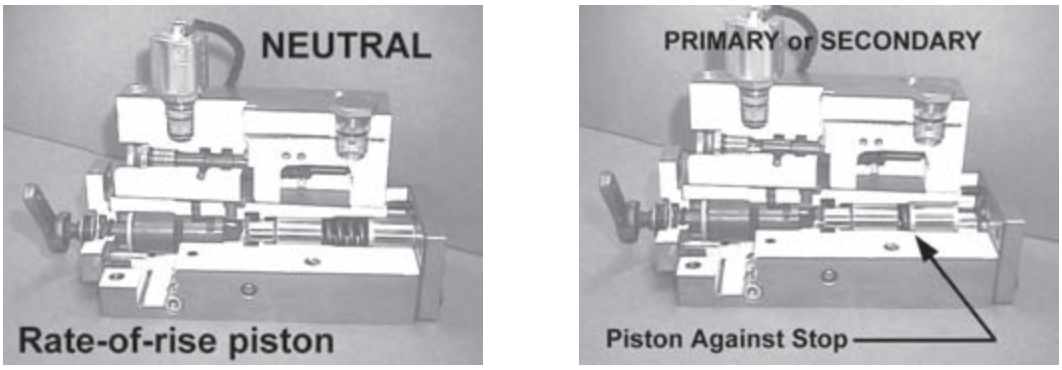


Figure 5. Rate-of-Rise Piston in Neutral (left) and Rate-of-Rise Piston with Clutch Engaged (right)

The travel rate of the rate-of-rise piston (and resulting pressure rate-of-rise) is controlled by the orifice size, regulator spring stiffness and the final main pressure after completion of the rate-of-rise cycle. Neutral main pressure controls the start time of the rate-of-rise cycle. When the rate-of-rise piston is against the stop (pressure regulating springs are compressed the most), the main oil pressure reaches approximately 356 psi.

When the control valve is shifted to Neutral, the clutch that was engaged is vented to sump within the valve. As a result, the passage behind the ball and spring regulator is vented to sump and induces a high differential pressure between the rate-of-rise chamber and the passage behind the ball and spring. Since the pressure in the rate-of-rise chamber is much greater than the pressure it is to be regulated at, the ball unseats from the orifice plate, allowing main oil pressure to return to the neutral pressure level rapidly and again be regulated by the ball and spring regulator. The ball returns to the pressure regulating position once the spring force is equal to force induced by the pressure at the rate-of-rise piston.

Electric Operation

The transmission normally operates with the control valve in the electric mode. Two spools, each controlled by a solenoid operated pilot valve, control clutch engagement. When a solenoid is energized, it opens the pilot valve and allows main pressure oil to flow to the end of the spool. The pressure acting on the end of the spool overcomes the return spring at the opposite end, causing the spool to stroke over and connect the clutch passage with main pressure passage.

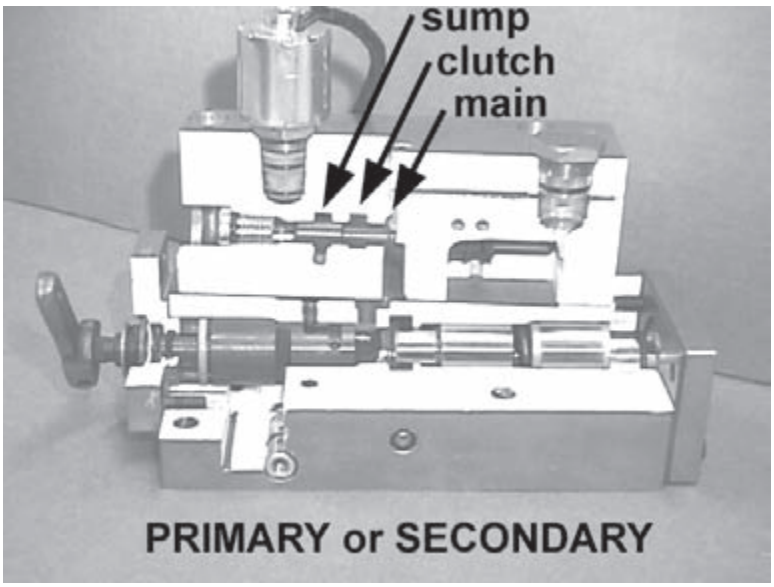


Figure 6. Pilot Spool Passages

Main pressure oil flows from the spools above to the clutch passages of the transmission below via connecting slots in the manual override stem. These connecting slots are aligned with passages in the valve body when the valve is in the electric mode.

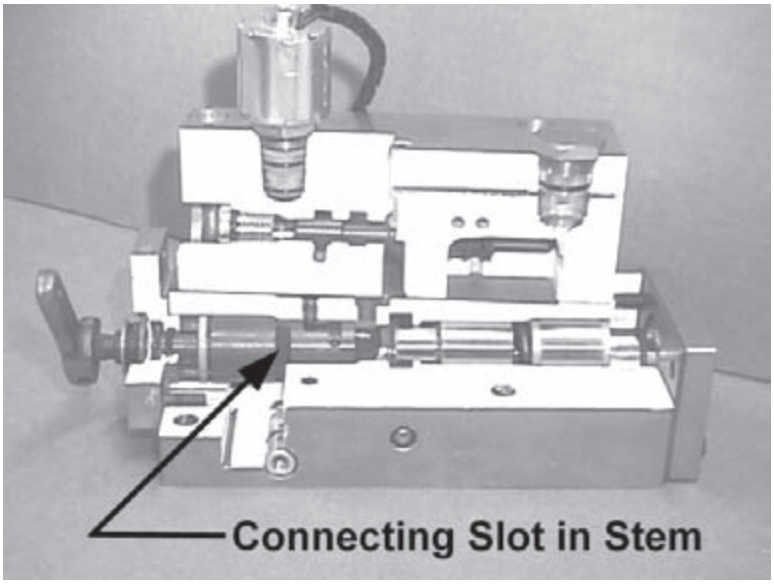


Figure 7. Flow Path in Override Spool

Main pressure from the energized solenoid operated pilot valve also acts on a pin on the return spring side of the opposite spool to ensure the opposite spool is connecting its clutch to sump. The clutch engagement cycle is outlined in the previous section.

Hydraulic Lock Feature (some models)

Some control valve models have a hydraulic lock feature, and are identifiable by a third solenoid operated pilot valve. This feature keeps the engaged clutch pressurized as long as the engine remains running, if electrical power fails or a malfunction occurs while the clutch is engaged. The hydraulic lock is accomplished by allowing pressurized oil (from the pressurized clutch passage) to flow inside the spool. Oil pressure inside the spool forces the dowel pin against the O-ring plug.

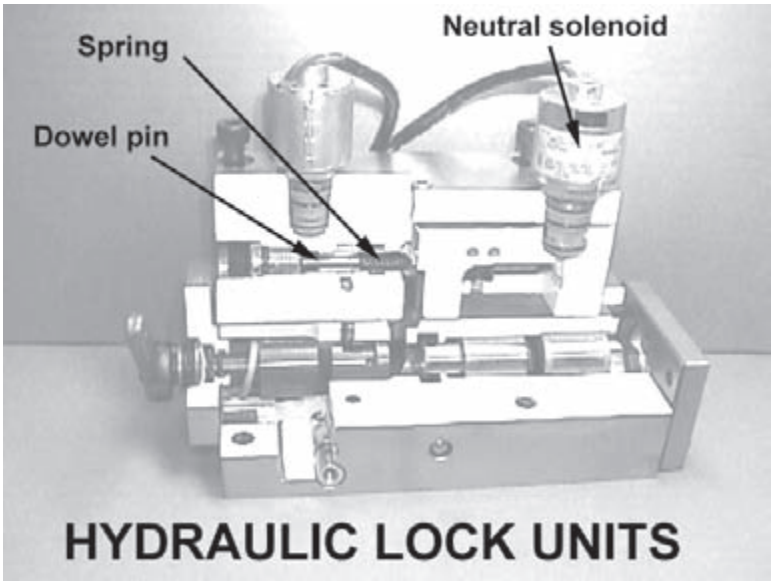


Figure 8. Hydraulic Lock Units

The resulting reaction is a force on the spool that overcomes the spool's return spring force. Should the solenoid become de-energized while the spool has its clutch pressurized, oil pressure will keep the spool in that position. This keeps the transmission in gear as long as the engine is running.

The hydraulic lock is disabled when either the engine is stopped, or the neutral solenoid is energized. When the Neutral solenoid is energized, it sends pressurized oil to the dowel pins at the return spring end of each spool.

Since the dowel pin used at the return spring side of the spool is larger in diameter than the dowel pin inside the spool, the hydraulic force acting on the larger pin forces the spool to connect the clutch passage to sump with assistance from the return spring.

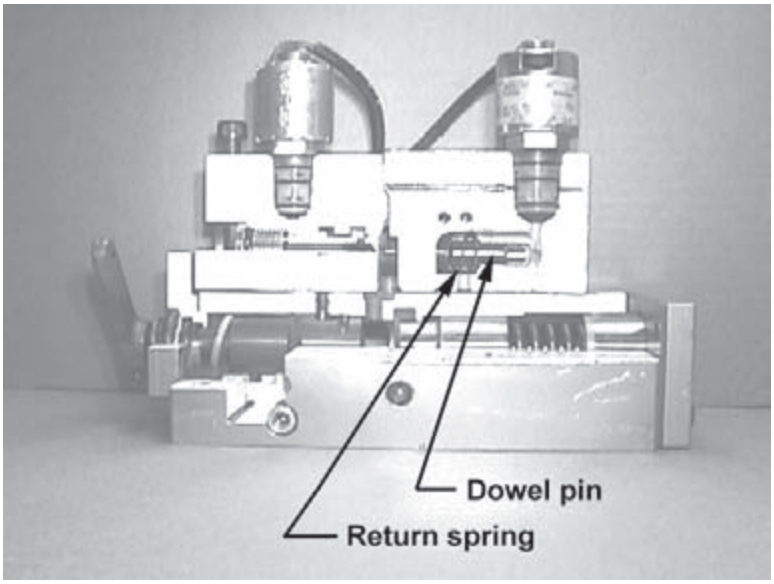


Figure 9. Neutral Solenoid Engaged

Manual Override Operation

The control valve has a manual override feature, which is a lever operated selector. When the manual override lever is rotated counterclockwise and pulled outward, the upper portion of the valve is disabled because the connecting slots in the manual override stem are no longer aligned with the oil passages in the valve body. Oil pressure from the solenoid operated pilot valve controlled spools cannot reach the clutch pressure passages in the transmission. The main oil pressure regulator, shuttle ball, neutral pressure regulator, and rate-of-rise functions remain exactly the same as when the valve is in the electric mode. In the manual override position, shifting is controlled by rotating the lever on the manual override stem.

In the Neutral position, both clutches are vented to sump by two pockets in the stem.

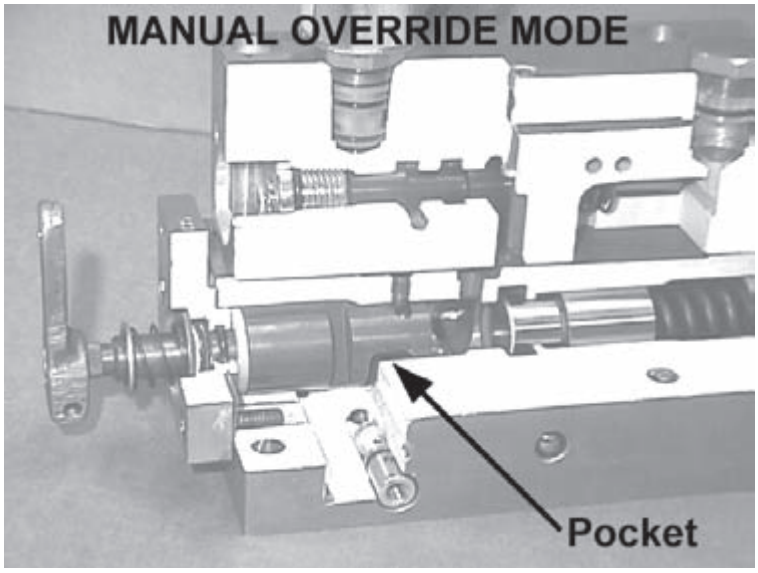


Figure 10. Stem Pocket or Passage

Main pressure oil can flow through the hole in the end of the stem to a narrow slot between the two pockets. This slot does not connect to any other passages when the stem is in the Neutral position.

When the lever and stem are rotated to engage either the primary or secondary clutch, main pressure oil flows through the slot in the stem to the appropriate clutch pressure port. The opposite clutch port passage remains connected to sump by the same pocket in the stem as when the stem was in the Neutral position. When the stem is rotated back to the Neutral position, the main pressure oil slot in the stem is no longer aligned with either clutch port. Both clutches are again vented to sump by the two pockets in the stem.

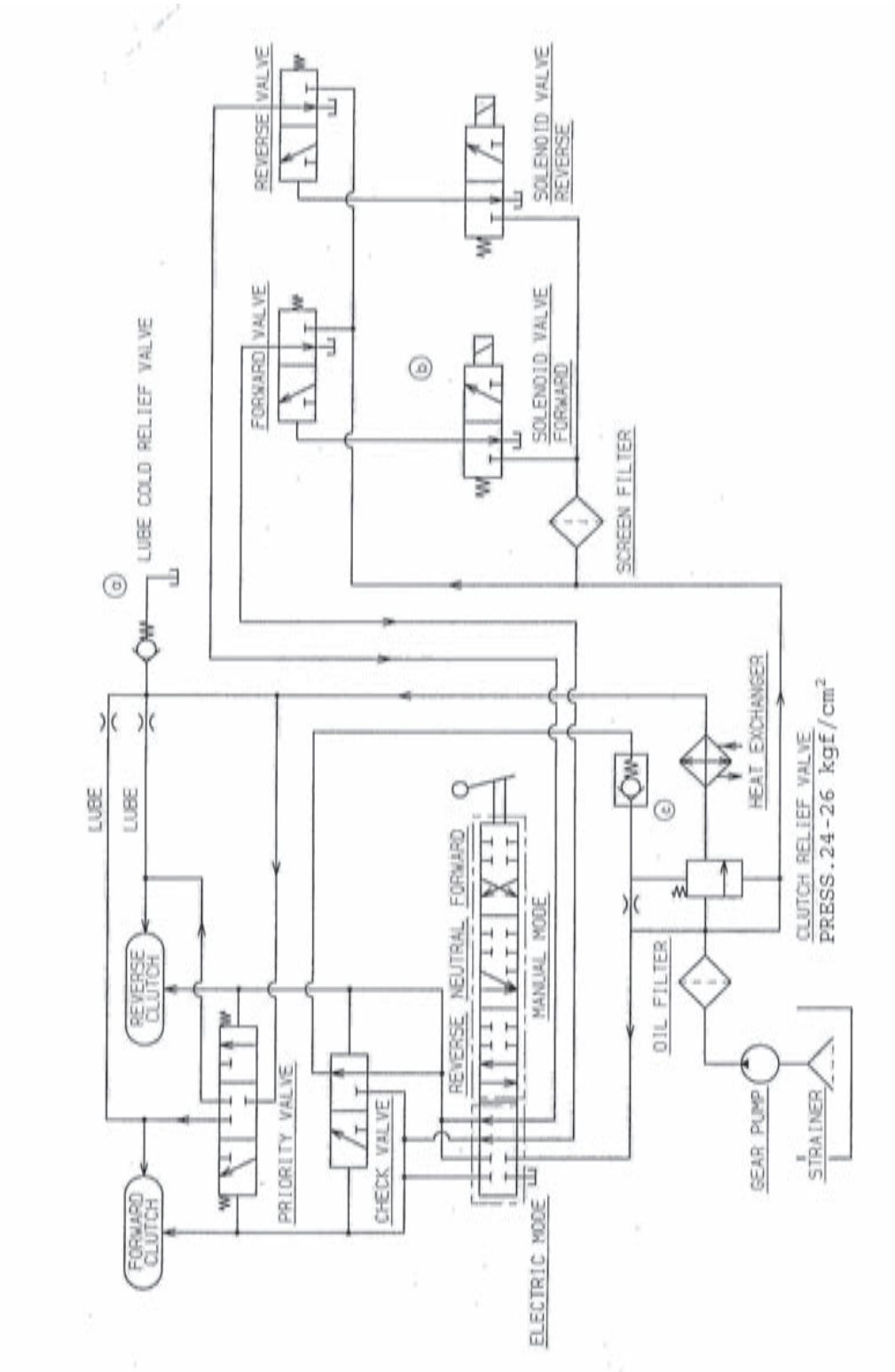


Figure 11. Hydraulic Schematic (electric control valve)

Trolling Valve (Optional)

The trolling valve is used to reduce and control propeller speed below that normally attained by operating the engine at low idle. Actuating the trolling function reduces clutch apply pressure to reduce the propeller speed.

The trolling valve for this transmission does not control the pressure in the rate-of-rise chamber. When in the trolling mode, it controls the flow of oil to the engaged clutch. Trolling is achieved by restricting the flow of main pressure oil to the engaged clutch, which ultimately controls the pressure in the engaged clutch of the transmission. The trolling feature is available when the selector valve is in the electric mode, but is disabled when the selector valve is in the manual override mode.

Main pressure oil can flow into the trolling valve through a fixed orifice at all times. Oil may exit the trolling valve through a variable orifice. The size of the variable orifice depends on the trolling valve lever position.

When the trolling valve lever is in the detented position, the variable orifice is closed. Since oil can flow into the trolling valve through the inlet orifice and is not allowed to escape, the oil pressure inside the trolling valve rises to match main oil pressure. This oil pressure inside the trolling valve pushes the piston assembly over to compress the large diameter spring behind it. The compressed spring pushes the flow control piston against its return spring, allowing unrestricted flow of oil to the engaged clutch. Unrestricted flow of oil to the engaged clutch results in full clutch apply pressure.

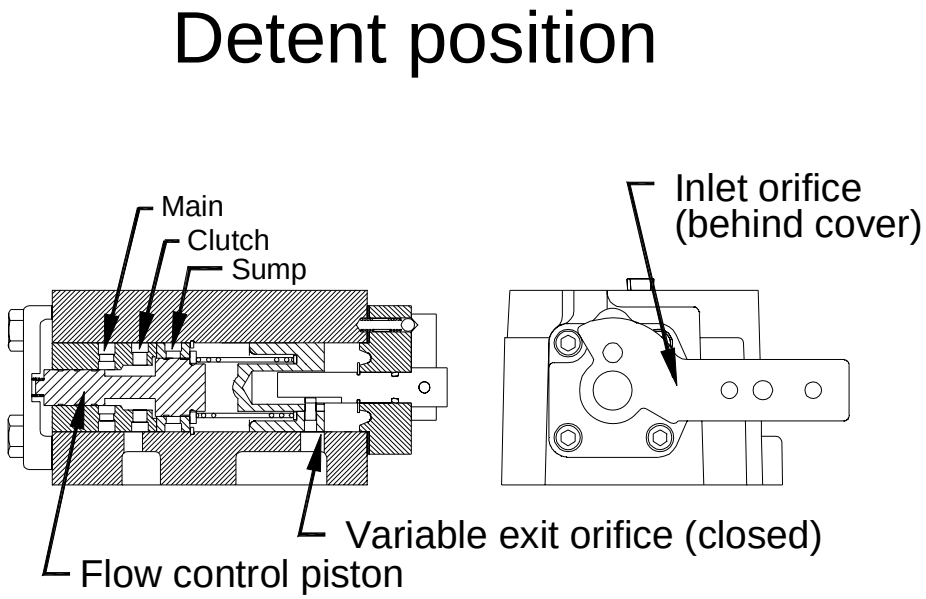


Figure 12. Trolling Valve in Non-trolling Position

Rotation of the trolling valve lever into the trolling mode opens the variable orifice, allowing some of the oil in the trolling valve to flow to sump. This reduction in oil pressure within the trolling valve allows the piston assembly to move toward the lever end of the valve, reducing the amount of compression in the spring behind it. Since the spring is no longer fully compressed, the flow control piston moves in its bore, and restricts the flow of main pressure oil to the engaged clutch. This causes the clutch apply pressure to be reduced, allowing the clutch plates in the transmission to slip. The amount of pressure reduction and resulting clutch slip is ultimately controlled by the trolling valve lever position.

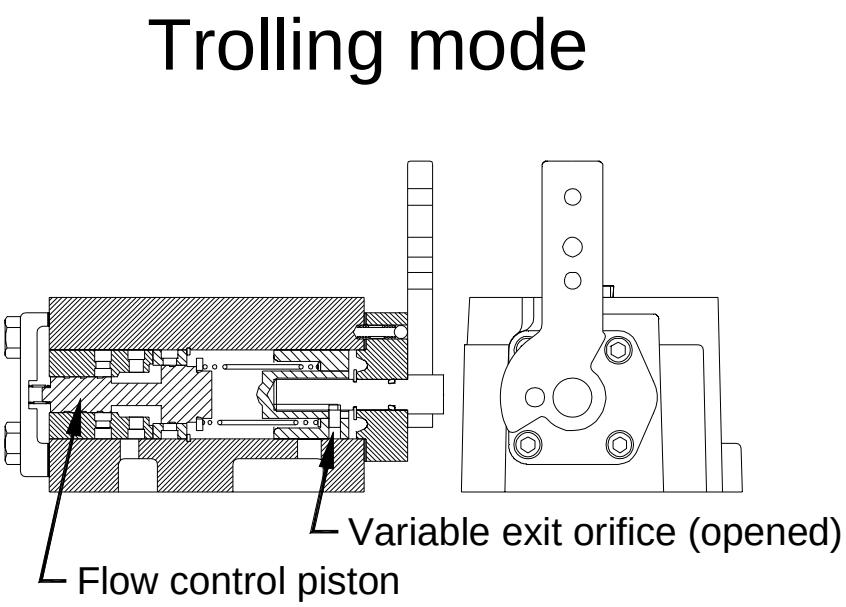


Figure 13. Trolling Valve in Trolling Position

Power Take-off (Optional)

There are two types of Power Take Offs available for this marine transmission. Both are designed to drive hydraulic pumps meeting SAE-J-744 with flange size 127, and shaft size 32-4 (SAE “C” 4 bolts).

Live Pump Mount Power Take-off

The live pump mount power take-off drives accessories using engine horsepower. Since the live power take-off connects the accessory to the primary shaft of the transmission via a direct coupling, the accessory is driven when the engine is running.

Hydraulic Clutched Pump Mount Power Take-off

The hydraulic clutched power take-off also allows accessories to be driven using engine horsepower. Since the power take-off is attached to the primary shaft of the transmission, the accessories can be driven any time the engine is running. The power take-off is engaged by the power take-off electric control valve that can be engaged manually if necessary.

The hydraulic clutched power take-off operates with oil pressure supplied by the transmission’s hydraulic system.

Trailing Pump (Optional)

The trailing pump is used to supply oil flow to the transmission lubrication circuit when the transmission is in a backdriving condition. Backdriving occurs when the engine is shut down and the transmission output shaft is being driven by water flow across the propeller.

The trailing pump is driven by the output shaft, and oil flow from the trailing pump flows through a check valve into the transmission's lubrication circuit below the heat exchanger.

Power Flow

Input power to the transmission is through a torsional coupling mounted on the engine flywheel. The coupling is splined to the forward end of the primary (forward clutch) shaft causing the primary shaft to rotate in engine direction during engine operation. Power is transmitted to the secondary shaft by means of the transfer gear teeth on the outer diameter of the primary clutch housing. These teeth are in constant mesh with gear teeth on the secondary clutch housing causing the secondary shaft to rotate in anti-engine direction. The primary and secondary pinions on their respective shafts, are in constant mesh with the output gear, which is connected to the output shaft through a keyless tapered joint.

Application of the primary clutch locks the primary pinion to the primary shaft causing the pinion to turn in the shaft direction and causing the output shaft to rotate in anti-engine direction. Application of the secondary clutch locks the secondary pinion to the secondary shaft causing the pinion to turn in the shaft direction and causing the output shaft to rotate in engine direction.

Neutral

When in Neutral the primary and secondary shafts, transfer gears and clutch friction plates rotate at engine speed.

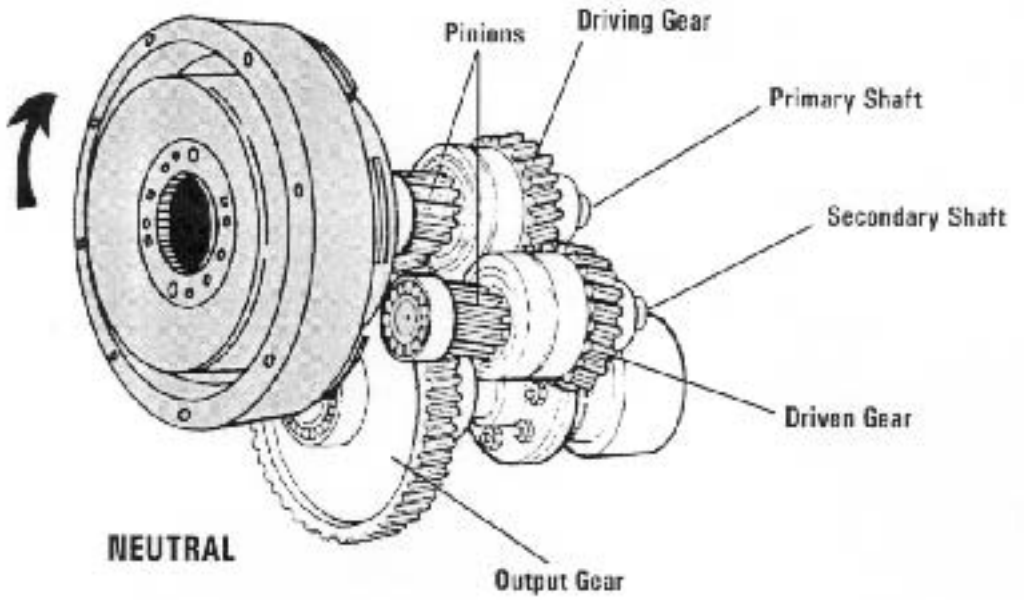


Figure 14. MG-6557A Power Flow in Neutral

Primary

When the Primary position is selected, hydraulic pressure is applied to the primary clutch piston clamping the friction and steel clutch plates together. The primary input pinion will then rotate at engine speed and direction because the steel plates are spline-connected through the clutch hub assembly to the pinion. Because the primary input pinion is in mesh with the output gear, the output gear and shaft will rotate in anti-engine direction. The secondary input pinion will be backdriven (engine direction) when the unit is in the primary position.

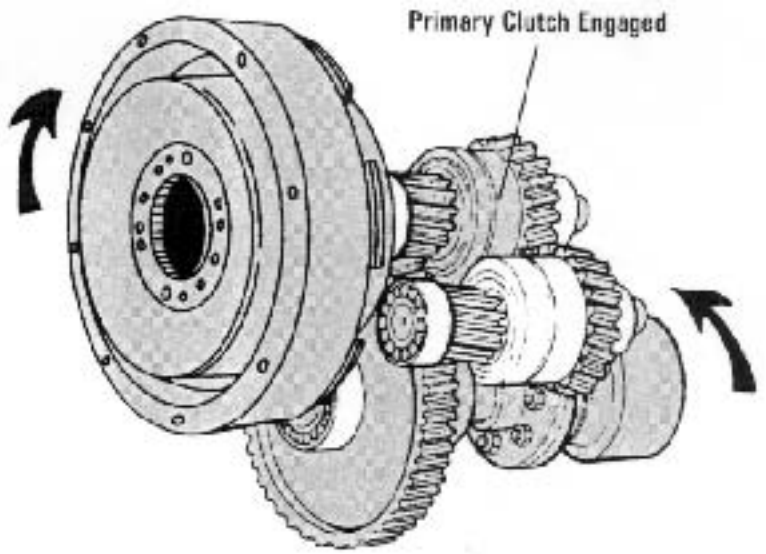


Figure 15. MG-6557A Power Flow with Primary Clutch Engaged

Secondary

In Secondary, the same parts are turning that were turning in Neutral. When the secondary position is selected, hydraulic pressure is applied to the secondary clutch piston clamping the friction and steel plates together. The secondary input pinion will then rotate at engine speed and anti-engine direction, because the steel clutch plates are spline connected through the clutch hub assembly to the input pinion. Because the secondary input pinion is in mesh with the output gear, the output gear and shaft will rotate in engine direction. The primary input pinion will be backdriven (anti-engine direction) when the unit is in the secondary position.

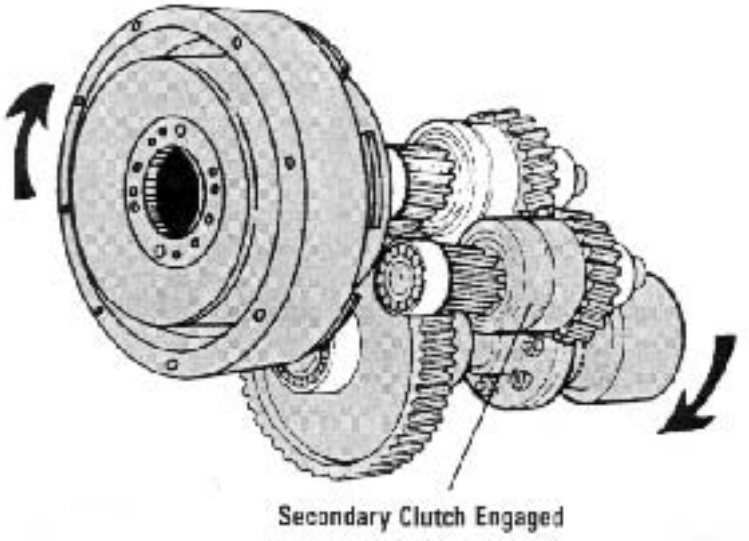


Figure 16. MG-6557A Power Flow with Secondary Clutch Engaged

NOTES

Preventative Maintenance

Lubrication

Grease the oil seals on the output end of the output shaft through the grease fitting with water pump (lithium soap-based NLGI No. 2) grease. Apply grease every 100 hours or when the boat is docked.

No other lubrication is required beyond the daily oil check.

Oil System

Oil Level

The oil level should be checked daily or every 10 hours. Check oil level before starting the engine to confirm that the transmission has oil in it. With the engine running at low idle and the transmission in Neutral, check the oil again. The oil level should be near the “low” oil level mark. Transmission oil temperature should be in the normal operating range prior to finalizing the oil level between the low and full marks on the oil level gauge.

Oil and Filter Change Interval

With a new transmission, change the oil and filter element within the first 50 hours of operation. Change oil and filter element after each 1000 hours thereafter or more often depending on conditions.

For a rebuilt transmission, check the filter element after eight hours of operation. If the filter is clean, install a new filter element and then change the oil and filter element after 1000 hours of service. If the filter is dirty, change the element and operate for another eight hours. Check the filter again. Continue this cycle until the filter is clean and then change the oil and filter after 1000 hours of service or more often depending on conditions.

Draining

Drain the transmission by removing the drain plug with the magnet at the rear side of the bottom cover.

Oil Suction Strainer

Remove and clean the pump suction strainer at every oil change or sooner if necessary. The suction strainer is located at the lower end of the pump. See Engineering Drawings for suction strainer location.

Type Oil Recommended

See Description and Specifications.

Filling

1. Remove the filler breather in the top cover of the transmission.

2. Fill the transmission's sump with 20 liters (5.3 U.S. gal) of the proper weight and type oil. See Description and Specifications for oil recommendations.

3. Start the engine and let it idle with transmission in neutral until oil is circulated throughout the hydraulic system. Add oil if necessary to bring the oil level up to the "low" mark with the engine at low idle.

4. With the oil at operating temperature, transmission in Neutral, and the engine running at low idle, check the oil level with the oil gauge. Add or remove oil if necessary to bring the oil level to "FULL" mark on the oil gauge.

5. Allow the oil temperature to cool to normal cold oil conditions (overnight). Check the oil level while cold at low idle engine speed while in Neutral. Make note of the oil level in the cold conditions for future reference, as it corresponds to the correct oil level at operating temperature.

Torsional Coupling

Do not obstruct the flywheel housing vents preventing the free flow of air for cooling the coupling. The ambient temperature of the air around the coupling should be between -6° C (22°F) and 80°C (176°F). Assure baffles are installed properly so hot air is ported out of the housing.

Visually inspect the element after the first 100 hours of operation and every 2000 hours thereafter, or every six months, whichever comes first. Torsional vibration, misalignment, degradation by contaminants (oil), heat, ultraviolet radiation, and excessive system torque can cause cracks or other signs of distress to appear on the surface of the rubber. These situations affect the life of the coupling element.

When inspecting the flexible coupling, look for evidence or conditions identified in the following steps:

- ❑ Cracks in the surface of the rubber. May be caused by torsional vibrations, excessive misalignment or exposure to contaminants (heat, petroleum products, chemicals, ozone, ultraviolet radiation) excessive system torques.
- ❑ Separation of rubber from flex plate on coupling plate or deterioration of the rubber-to-metal bond. See above.
- ❑ Deterioration of the rubber element, as evidenced by sponginess or by black carbon-like dust on rubber surface. May be caused by contaminants or excessive heat, either external or internal to the coupling.
- ❑ Cracked, bent or otherwise damaged flex plate or coupling plate.
- ❑ Bolt holes in flex plate or coupling plate elongated oval shaped, not round. This could be caused by improperly assembled parts, loose parts, vibration or improperly torqued parts.
- ❑ Bolts/nuts—bent, worn or stripped threads.

Inspect the hub, looking for the following:

- ❑ Damaged or worn splines.
- ❑ Cracked parts.
- ❑ Oil seal surface for wear or damage.

Replace any defective parts including defective fasteners.

Heat Exchanger Check

Heat exchangers furnished by Twin Disc to be used for salt water applications have zinc rods installed at the inlet and outlet heads. These rods must be checked every 90 days. If over 50% of the rod is disintegrated, it should be replaced to provide effective protection.

Excessive corrosion of the zinc rod indicates electrolytic action. A careful inspection should be made to determine if this action is caused by a short circuit or external grounded electric current. If these conditions do not exist, it is evident that the corrosion is due to local electrolysis. If rods are corroded with foreign materials, they should be cleaned with a wire brush.

In-Boat Repair

Certain transmission maintenance/repair procedures can be accomplished in the boat provided sufficient space exists to work. These procedures are:

- ❑ Removing and installing the oil pump.
- ❑ Changing the filter.
- ❑ Removing, cleaning and installing the suction strainer.
- ❑ Removing and installing the control valve.
- ❑ Removing and installing the manifold.
- ❑ Removing, servicing and installing the clutch shaft assemblies.

Overhaul Interval

A complete overhaul of the unit should be made at the same time the engine is overhauled.

Periodic Visual Inspection

- ❑ Check the mountings for tightness or damage such as cracks. Tighten loose mountings and replace damaged parts.
- ❑ Check pressure and temperature gauge where applicable.
- ❑ Inspect the oil lines and heat exchanger for leaky connections, cracks, or other damage. Replace damaged lines.
- ❑ Periodically, inspect the drive line and the input and output shaft oil seals for leakage. Replace parts as required.

Troubleshooting

Troubleshooting Chart

The following chart is intended as a guide for determining the cause of problems that could be encountered and the corrective actions.

The transmission is one part of a complete power package. Problems in the input power system or the output power delivery components can cause problems to develop in the transmission. It is important that the entire power package be considered when problems are encountered.

Tables begin on the next page.

Table 11. Troubleshooting Chart

Symptom	Cause		Remedy	
1. Low main oil pressure	1-1	Partially clogged oil strainer	1-1	Remove and clean oil strainer.
	1-2	Stuck pressure regulation piston.	1-2	Disassemble the valve and clean the piston.
	1-3	Broken piston rings on clutch shaft(s).	1-3	Remove the collector and inspect piston rings.
	1-4	Damaged or worn oil pump assembly.	1-4	Replace damaged or worn oil pump assembly (pump is not serviceable)
	1-5	Incorrect linkage adjustment to control valve assembly.	1-5	Adjust linkage so that control valve stem is indexed properly by detent.
	1-6	Clogged or plugged orifice in orifice plate of control valve assembly.	1-6	Remove orifice plate cover. Clean parts.
	1-7	Shimming required between regulator springs and rate-of-rise piston.	1-7	Shim as required.
	1-8	Engine idle speed too low.	1-8	Raise engine speed.
2. No oil pressure, or erratic low pressure at control valve tap.	2-1	Oil pump suction strainer plugged.	2-1	Remove and clean strainer.
	2-2	Oil level low.	2-2	Check oil level and correct.
	2-3	Air leak on suction side of pump.	2-3	Correct cause of air leak.
	2-4	Pump drive on reverse clutch shaft broken.	2-4	Disassemble and repair as required.
	2-5	Regulating valve stuck in open position	2-6	Remove, disassemble, clean and repair the regulating valve.
	2-6	Oil pump defective	2-7	Replace oil pump.
	2-7	Leaking heat exchanger has caused oil to be lost over board.	2-7	Replace heat exchanger

Table 11. Troubleshooting Chart (continued)

Symptom	Cause		Remedy	
3. High main oil pressure.	3-1	Regulating valve stuck.	3-1	Remove and clean regulating valve.
	3-2	Improperly shimmed.	3-2	Shim as required.
	3-3	Lube relief valve malfunction.	3-3	Inspect, repair or replace parts as necessary.
4. High temperature.	4-1	Improper oil level.	4-1	Check and fill (or drain) with proper oil to the correct level.
	4-2	Faulty heat exchanger	4-2	Inspect, repair, or replace heat exchanger.
	4-3	Clutches slipping	4-3	Check clutch apply oil pressure. If pressure is normal, remove, disassemble, and repair slipping clutch.
	4-4	Bearing failure.	4-4	Overhaul marine transmission.
	4-5	Air leak on suction side of pump.	4-5	Inspect and correct cause of suction leak.
	4-6	Control valve malfunction	4-6	Inspect, repair, or replace control valve.
5. Excessive Noise	5-1	Bearing failure.	5-1	Overhaul marine transmission.
	5-2	Worn or damaged input coupling.	5-2	Remove marine transmission. Replace a worn or damaged coupling.
	5-3	Excessive torsional vibration.	5-3	Select proper torsional coupling.
	5-4	Worn or damaged gears.	5-4	Overhaul marine transmission.
	5-5	Improper alignment.	5-5	Check alignment of engine and transmission output flange to propeller shaft. Correct as necessary.
	5-6	Damaged propeller.	5-6	Repair propeller.
	5-7	Misfiring engine.	5-7	Repair engine.

Table 11. Troubleshooting Chart (continued)

Symptom	Cause		Remedy	
6. No neutral.	6-1	Clutch plates warped.	6-1	Remove clutch plates. Overhaul unit.
	6-2	Control valve incorrectly indexed.	6-2	Check and adjust control linkage.
	6-3	Solenoid malfunction (units equipped with electric selector valve)	6-3	Replace defective solenoid.
	6-4	Hydraulic lock piston stuck (units equipped with electric selector valve and hydraulic lock).	6-4	Inspect, repair, or replace hydraulic lock spool.
7. Harsh engagement.	7-1	Regulating piston or rate-of-rise piston stuck.	7-1	Disassemble control valve. Clean parts. Replace parts if necessary.
	7-2	Orifice plate ball in control valve not seating properly.	7-2	Remove orifice plate cover. Clean parts. Replace parts if necessary.
	7-3	Blown gasket on either side of orifice plate.	7-3	Replace gasket.
8. Low lube oil pressure.	8-1	Pump flow output too low.	8-1	Replace pump.
	8-1	Pump suction strainer plugged.	8-2	Remove, clean, inspect, and install the suction screen.
	8-3	Air leak on suction side of pump.	8-3	Inspect and correct cause of suction leaks.
	8-4	Lube relief valve malfunction.	8-4	Remove and clean or replace parts as necessary.
	8-5	Broken piston rings.	8-5	Replace damaged piston rings.
9. Oil spilling out of breather.	9-1	Oil level too high.	9-1	Adjust oil level.
	9-2	Wrong type of oil.	9-2	Draw and refill with recommended oil.

Disassembly

Prepare Transmission for Disassembly

Note: During the service of this unit, all O-rings, gaskets and seals must be replaced. It is good practice to keep the used components (O-rings, gaskets, and seals) with the appropriate components for reference during the inspection and assembly process (to make sure you don't forget the quantity, size, etc.).

⚠ CAUTION

Flat washers are used under all fasteners where the head of the fastener contacts an aluminum surface.

Pipe threads called out as PT on drawings and in this text are different from NPT threads. PT threads and NPT threads are NOT interchangeable. Adapters are available from several manufacturers to convert PT threads to NPT threads.

Most pusher screws used in the disassembly of this transmission are threaded through aluminum parts. ALWAYS LUBRICATE the threads of the pusher screw before threading it into the mating part. When installing pusher screws, avoid rapid tightening with an impact wrench or similar device. If an impact wrench is used with the pusher screws the threads may gall or seize in the aluminum part. Tighten pusher screws in an even manner to avoid damaging components.

Component Identification

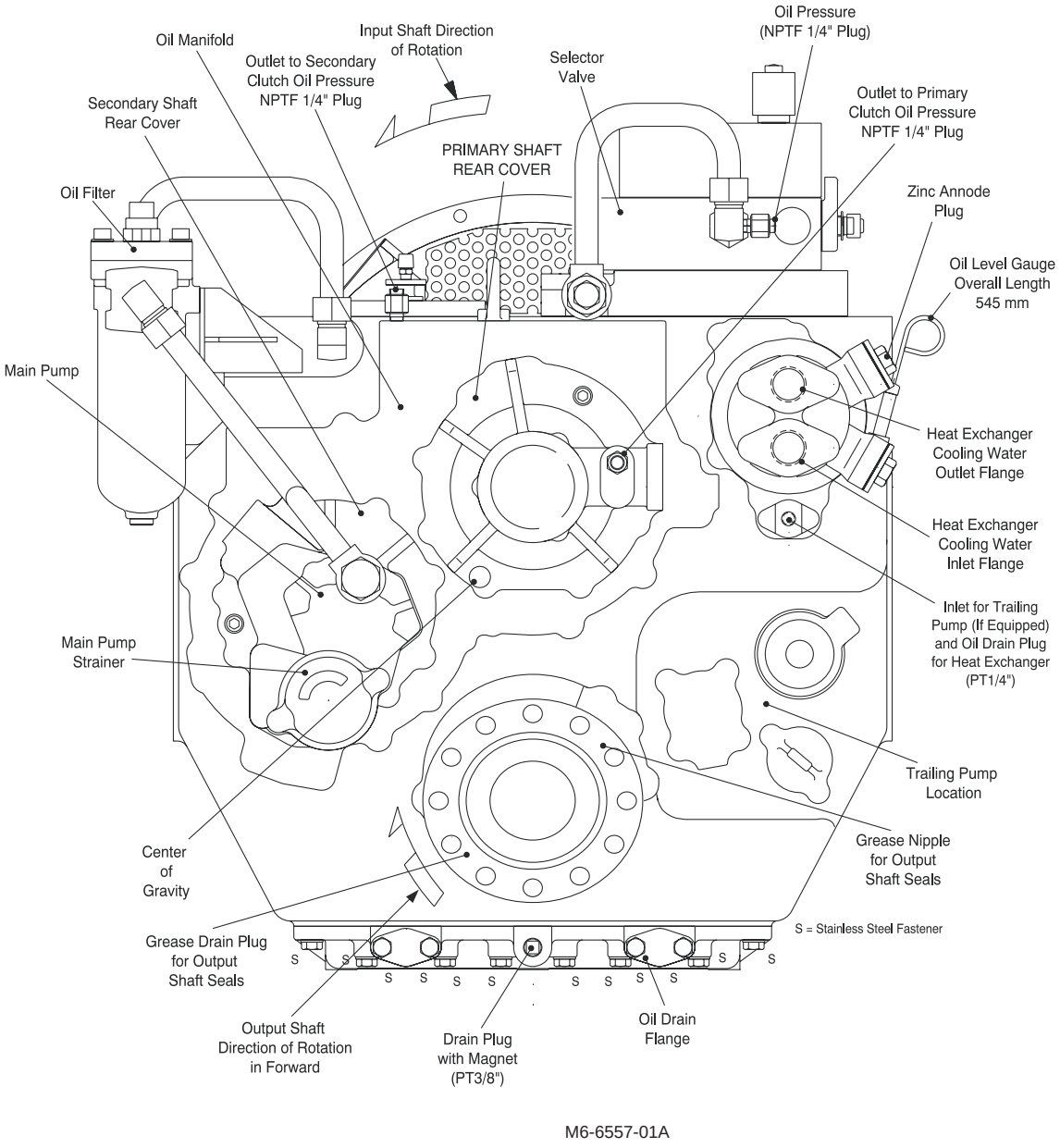

Oil Manifold
Input Shaft Direction of Rotation
Outlet to Secondary Clutch Oil Pressure NPTF 1/4" Plug
Selector Valve
Oil Pressure (NPTF 1/4" Plug)
Secondary Shaft Rear Cover
Outlet to Primary Clutch Oil Pressure NPTF 1/4" Plug
PRIMARY SHAFT REAR COVER
Oil Filter
Zinc Annode Plug
Oil Level Gauge Overall Length 545 mm
Main Pump
Heat Exchanger Cooling Water Outlet Flange
Heat Exchanger Cooling Water Inlet Flange
Inlet for Trailing Pump (If Equipped) and Oil Drain Plug for Heat Exchanger (PT1/4")
Main Pump Strainer
Trailing Pump Location
Grease Nipple for Output Shaft Seals
Center of Gravity
S = Stainless Steel Fastener
Grease Drain Plug for Output Shaft Seals
Output Shaft Direction of Rotation in Forward
Drain Plug with Magnet (PT3/8")
Oil Drain Flange
M6-6557-01A

Figure 17. MG-6557A Component Identification and Location

Drain Oil

Transmission Sump

Drain the oil from the transmission sump by removing the square head 3/8" PT pipe plug from the bottom, rear side of the transmission bottom housing.

Heat Exchanger

Drain the oil from the heat exchanger by removing the pipe plug from the bottom of the heat exchanger rear cover.

Remove Transmission External Components

Torsional Coupling

Remove the torsional coupling from the input drive sleeve (if not previously removed).

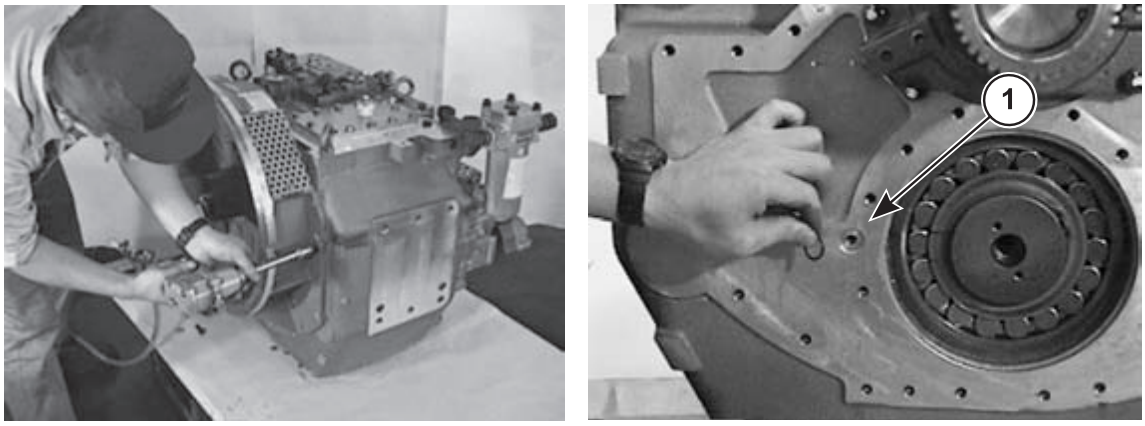
Front Housing

1. Remove the front housing from the transmission main housing. The front housing (constructed of aluminum) is equipped with two pusher screw locations near the housing dowel pin locations to assist in the removal of the housing. Thread two M10-1.5 x 60 mm fully threaded cap screws (lubricated) into the pusher screw locations to push the front housing away from the main transmission housing.

⚠ IMPORTANT

Always lubricate the pusher screw threads before use. Always tighten pusher screws in an even manner.

2. Remove the O-ring (1) located between the front housing and main transmission housing.



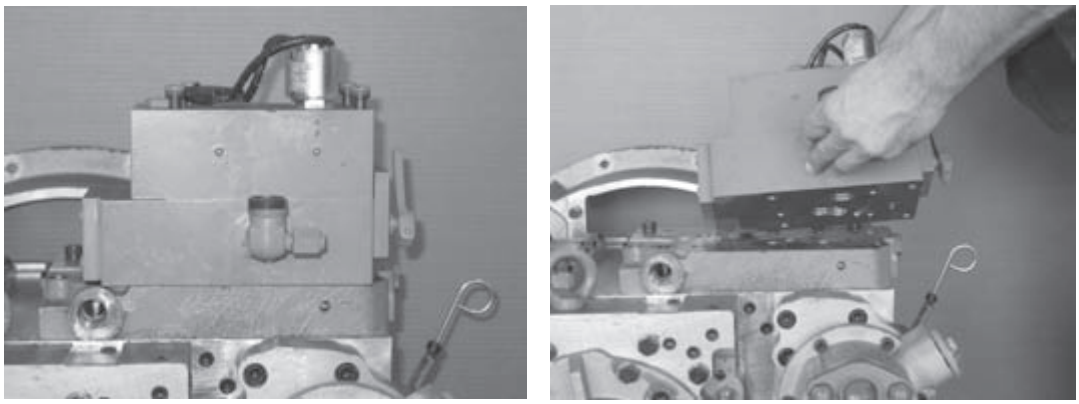
R007-6557 AR012-6557

Figure 18. Transmission Front Housing and O-ring (1) Removal

Selector Valve and Oil Filter

1. Disconnect oil supply tube from the filter housing and the selector valve.

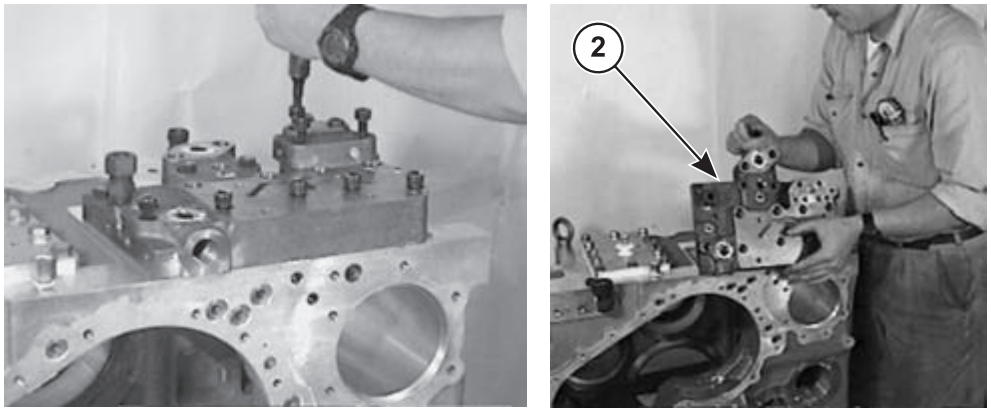
2. Remove the selector valve.



R6557-1063BE R6557-1065BE

Figure 19. Selector Valve Removal

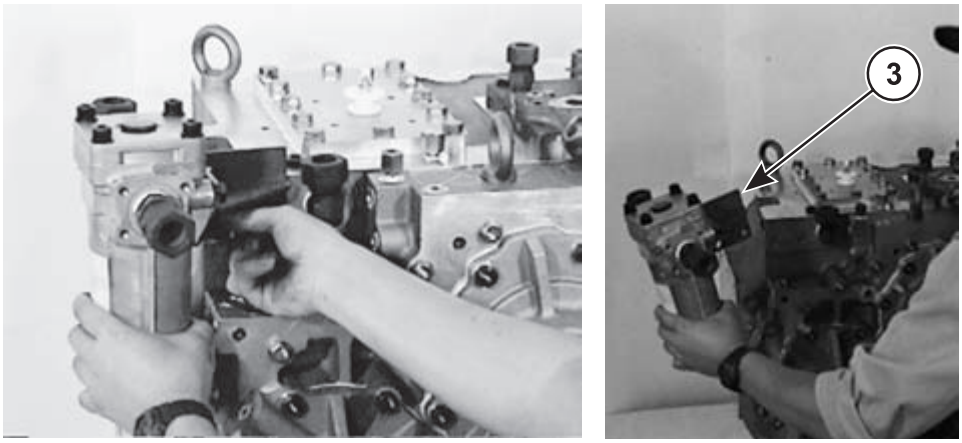
3. Remove control valve ditch plate (2) and gasket.



R161A-6557 AR162-6557

Figure 20. Ditch Plate (2) Removal

4. Remove the oil filter (3) and the oil filter bracket.

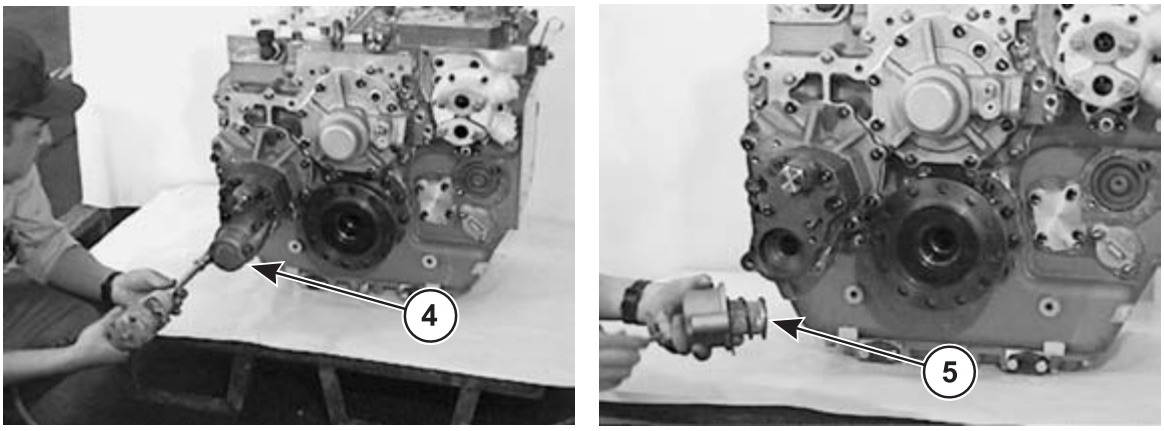


R016-6557 AR020-6557

Figure 21. Oil Filter (3) Removal

Suction Strainer

1. Remove the suction strainer cover (4) from below the pump and remove the suction strainer. The cover of the suction strainer (5) is sealed with an O-ring. The suction strainer is located inside a spring to hold the suction strainer into position.



AR018-6557 AR022-6557

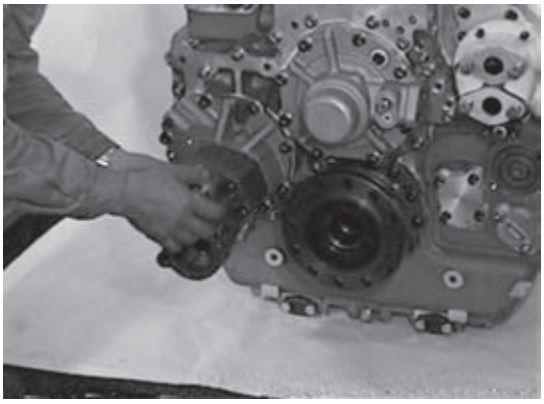
Figure 22. Suction Strainer Cover (4) and Suction Strainer (5) Removal

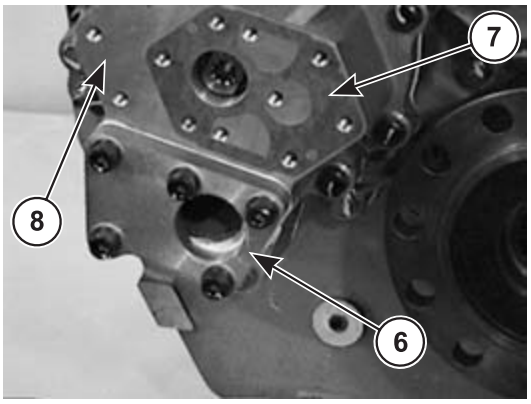
Oil Pump

1. Remove the oil pump and the jumper tube located behind the pump. The jumper tube is sealed at each end with an O-ring and is fitted into a suction adapter plate (6) on the rear side of the transmission.

2. The oil pump is sealed to the pump mounting plate (8) with a gasket (7). Note the orientation of the gasket on the pump mounting plate to assist in the re-assembly process.

3. Remove the oil pump suction adapter plate (6). Note the orientation of the suction adapter plate to assist in the re-assembly process.





R029-6557 AR033-6557

Figure 23. Oil Pump Removal

Heat Exchanger

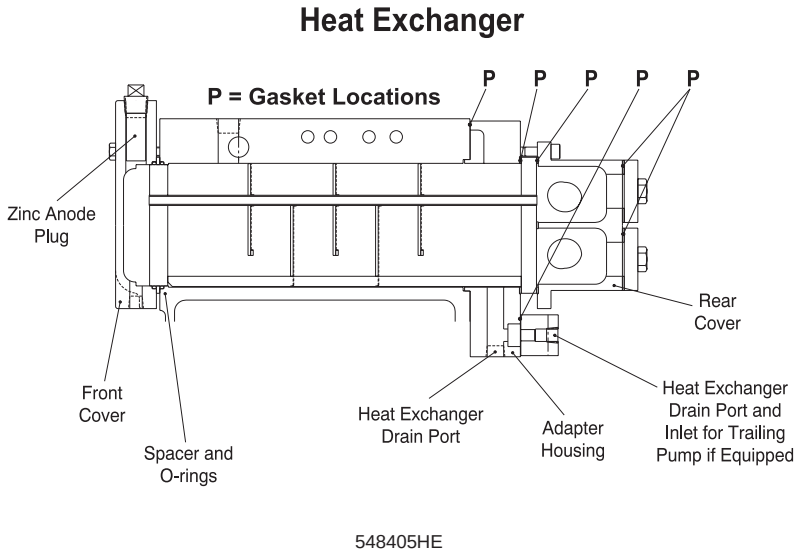


Figure 24. Heat Exchanger Component Identification and Location

1. Remove the rear cover (1) and gasket from the heat exchanger.

2. Mark the heat exchanger core (2) at the top to ensure it will be replaced into the transmission housing correctly.

   Note: The rear heat exchanger cover (1) is equipped with a divider (3) separating the inlet of the heat exchanger from the outlet of the heat exchanger.

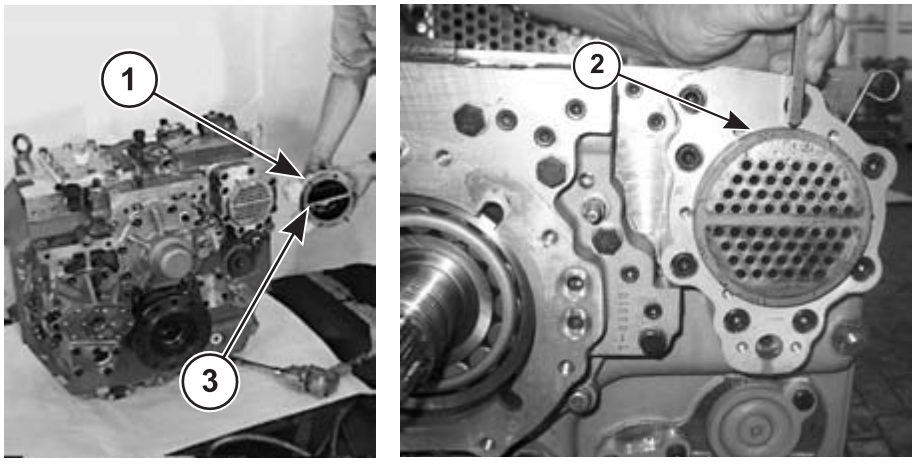
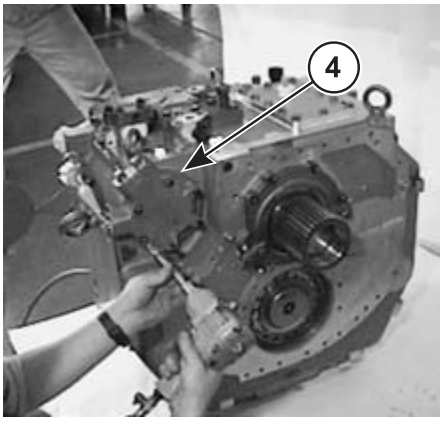
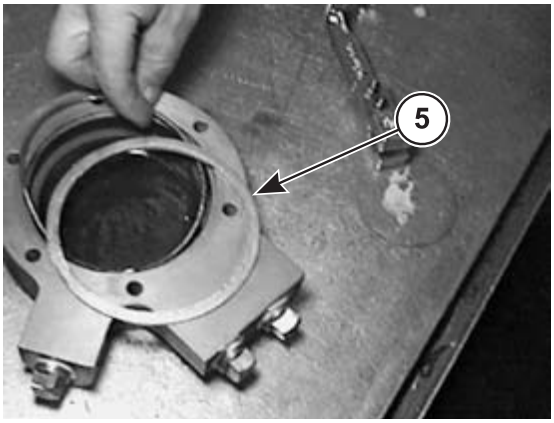


Figure 25. Heat Exchanger Core Indexing (2) and Cover Removal (1)

2. Remove the front cover (4), spacer (5), and two O-rings from the heat exchanger.

Note: The front cover of the heat exchanger uses a spacer (5) to locate the heat exchanger correctly in the transmission housing. The spacer is sealed on each side with an O-ring.

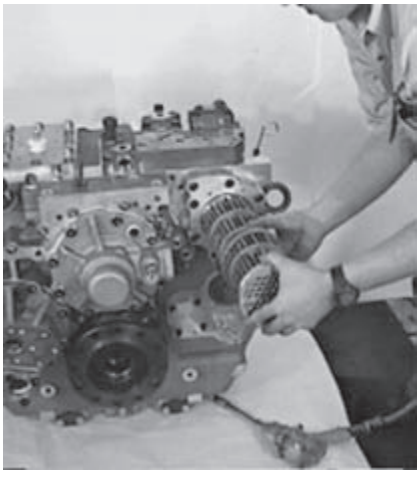




AR035-6557 AR037-6557

Figure 26. Heat Exchanger Front Cover (4) Removal

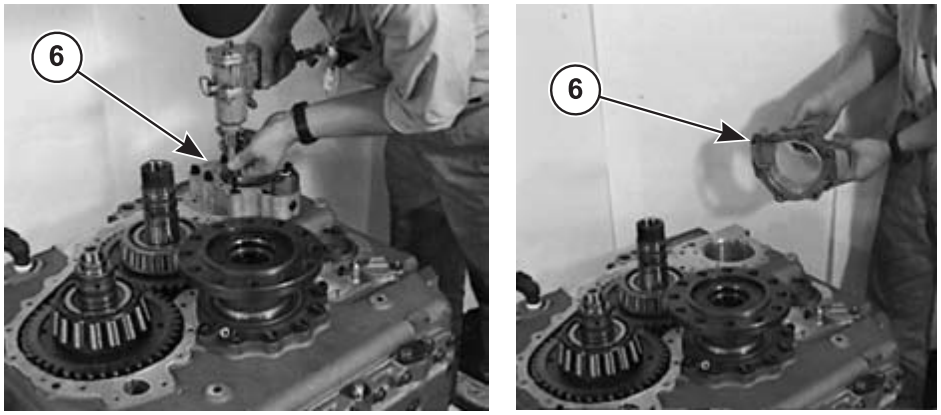
3. Remove the heat exchanger core and gasket.



R041-6557 R043A-6557

Figure 27. Heat Exchanger Core Removal

4. Remove the screws retaining the heat exchanger adapter housing and sealing gasket.

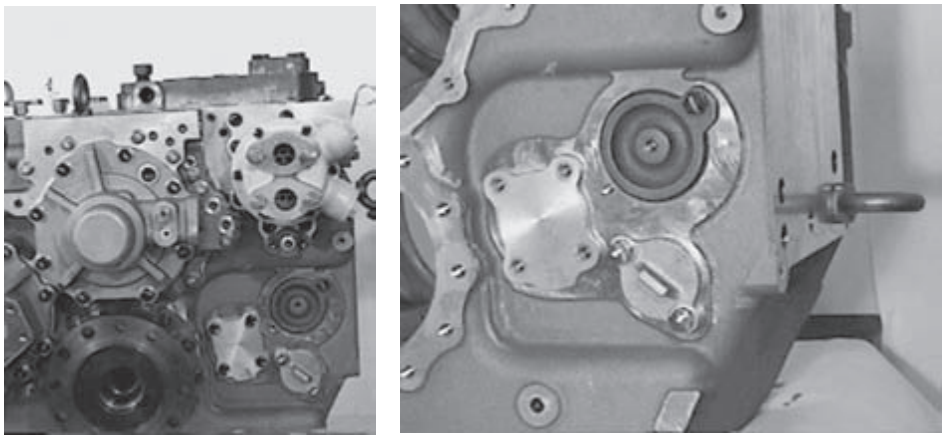


AR087-6557 AR091-6557

Figure 28. Heat Exchanger Adapter Plate (6) Removal

Trailing Pump (if equipped)

Remove the trailing pump from the transmission housing (if equipped). The trailing pump is located on the rear side of the transmission in the lower right hand corner.



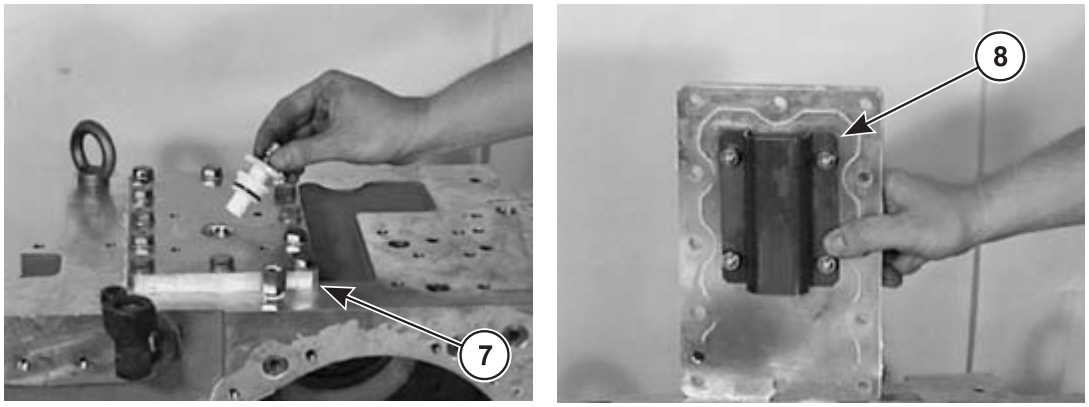
R034-6557 R148-6557

Figure 29. Trailing Pump Removal (if equipped)

Top Cover with Oil Baffle

Remove the transmission top cover (7). The top cover contains the filler cap/breather.

Note: On the bottom surface of the top cover is an oil baffle (8) to prevent oil leakage through the breather. Do not remove the baffle from the top cover unless replacement is necessary.



AR164-6557 AR165-6557

Figure 30. Top Cover Removal

Remove Primary and Secondary Clutch Shaft Assemblies

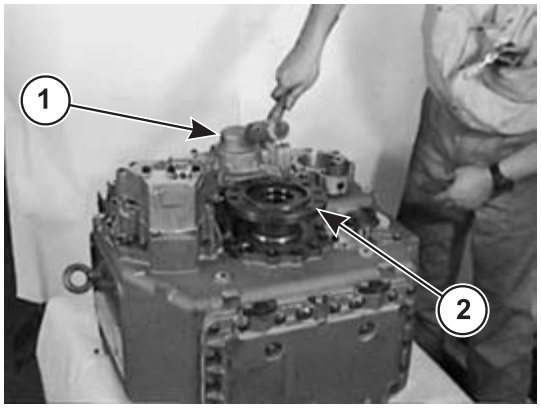
Remove Primary Clutch Shaft Rear Cover

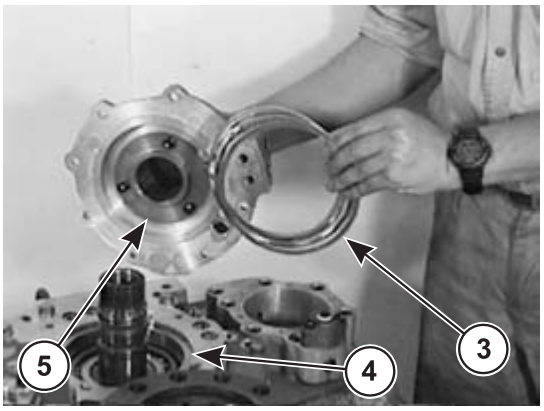
1. Place the transmission on blocks with the output flange (2) at the top. Be sure transmission is supported securely.

⚠ IMPORTANT

Allow a minimum of 200 mm clearance below the transmission housing to allow the future removal of the input drive sleeve while the transmission is in this position.

2. Remove the screws retaining the primary clutch shaft cover (1).
   a. Gently tap the shaft cover to break the sealer bond from the transmission housing.
   b. Remove the cover (1), the shims (3), and the bearing spacer (4). Tag the components with identifying information.

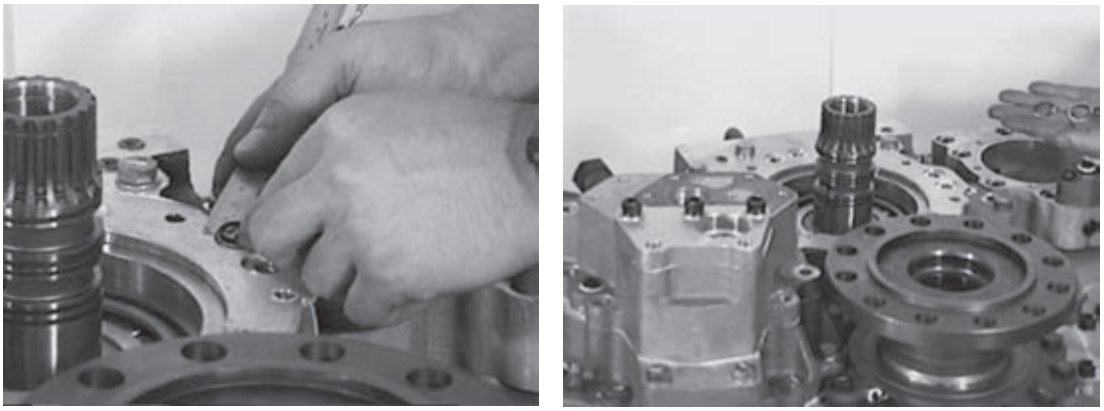




AR052-6557 AR054-6557

Figure 31. Primary Clutch Shaft Cover Removal

3. Remove the six O-rings located in the manifold counterbores.

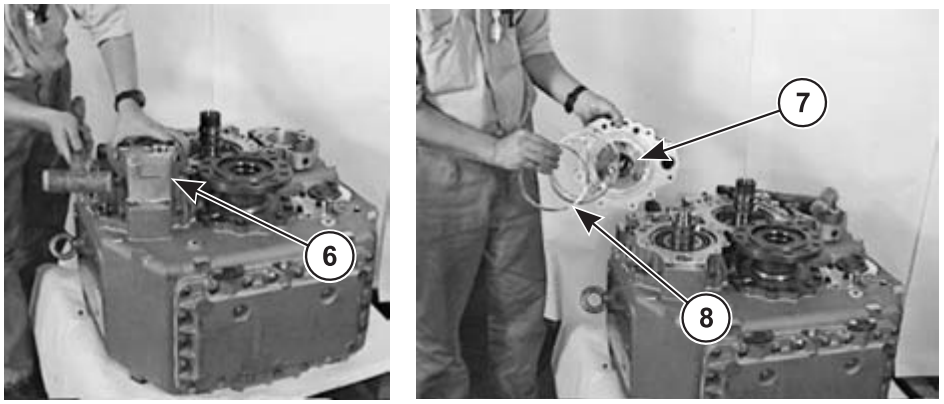


R058-6557 R059-6557

Figure 32. O-ring Removal From Manifold

Remove Pump Mount

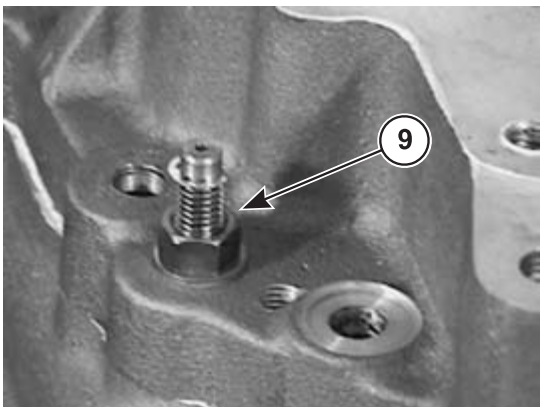
1. Remove the screws retaining the secondary shaft rear cover.
   a. Gently tap the pump mount (6) to break the sealer bond from the transmission housing.
   b. Remove the cover and the shims (8). Tag the components with identifying information.
   c. Remove the two O-rings located in the manifold counterbores.

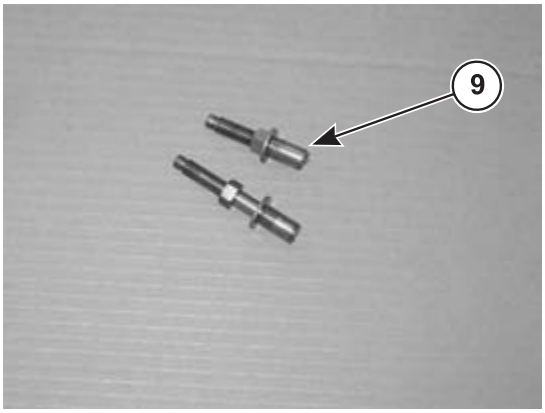


AR060-6557 AR063-6557

Figure 33. Pump Mount (6) and Shim (8) Removal

2. Remove the screws retaining the manifold to the rear of the transmission housing.

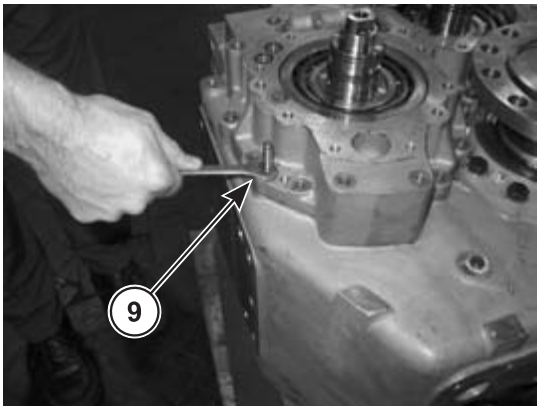


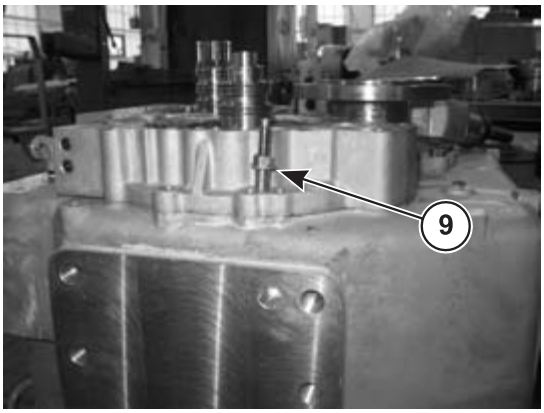


AR069-6557 AR6557026BE

Figure 34. Dowel Pins (9)

3. Tighten the nut on the dowel pin (9) to pull the dowel out of the transmission housing. Tighten the nuts until they bottom on the end of threads. Pulling the dowel pin from the transmission housing will assist in removal of the manifold.





AR6557025BE AR6557029BE

Figure 35. Dowel Pin Removal

Remove Manifold

1. The manifold (2) is equipped with two pusher screw (1) locations near the dowel pins to assist in the removal of the oil manifold. Thread two M10-1.5 x 60 mm fully threaded cap screws (lubricated) into the pusher screw locations to push the oil manifold away from the transmission housing.

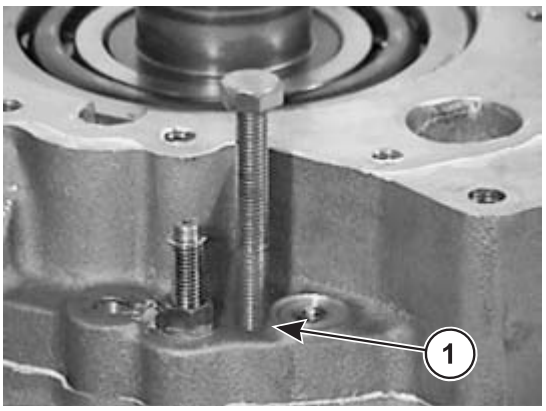
⚠ IMPORTANT

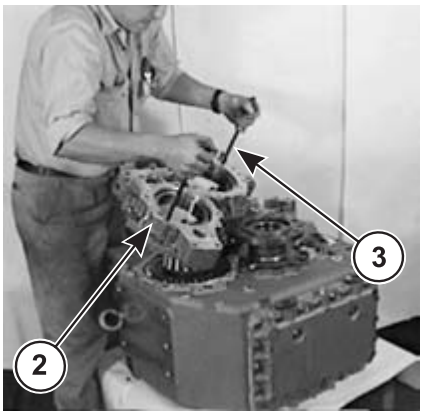
Always lubricate the pusher screw (1) threads before use. Always tighten pusher screws in an even manner.

2. Remove the manifold from the transmission housing.

⚠ CAUTION

Use caution in removing the manifold from the transmission housing. The forward and reverse shaft bearing cups could fall out of the manifold as it is being removed.





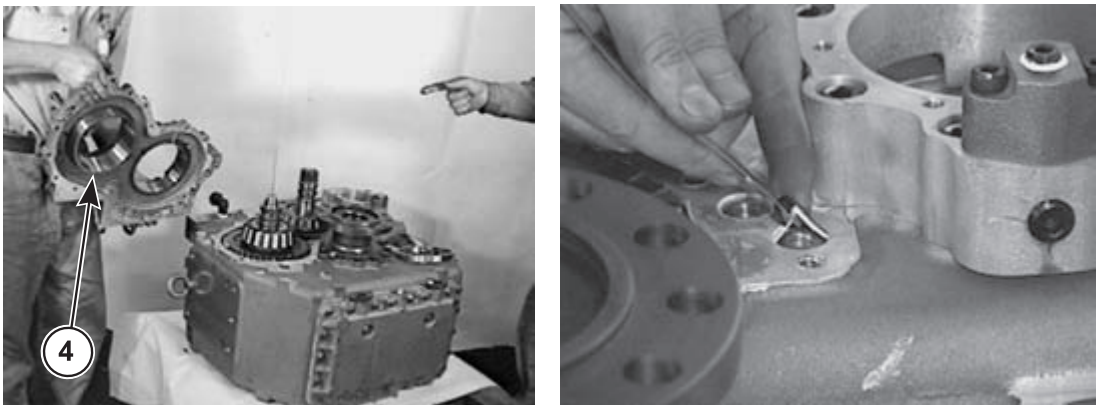
AR072-6557 AR075-6557

Figure 36. Manifold (2) Removal

3. Remove the primary shaft and secondary shaft rear bearing cups (4) from the manifold.

   Note: The primary and secondary shaft bearing cups are different from each other. Tag the components with identifying information.

4. Remove the O-rings located in the transmission housing behind the manifold.



AR079-6557 R083-6557

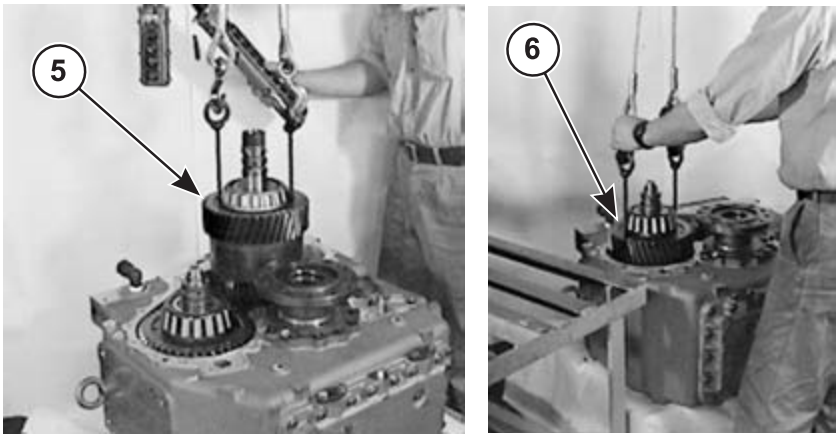
Figure 37. Primary and Secondary Clutch Shaft Bearing Cup (4) and Housing O-ring Removal

Remove Primary and Secondary Clutch Shafts

1. Install two lifting eyes (M10-1.5) into the primary shaft transfer gear (5) and lift the shaft out of the transmission housing.

2. Install lifting eyes (M10-1.5) into the secondary shaft transfer gear (6) and lift the shaft out of the transmission housing.

   Note: Set the Primary and Secondary clutch shaft assemblies aside until further disassembly is required.

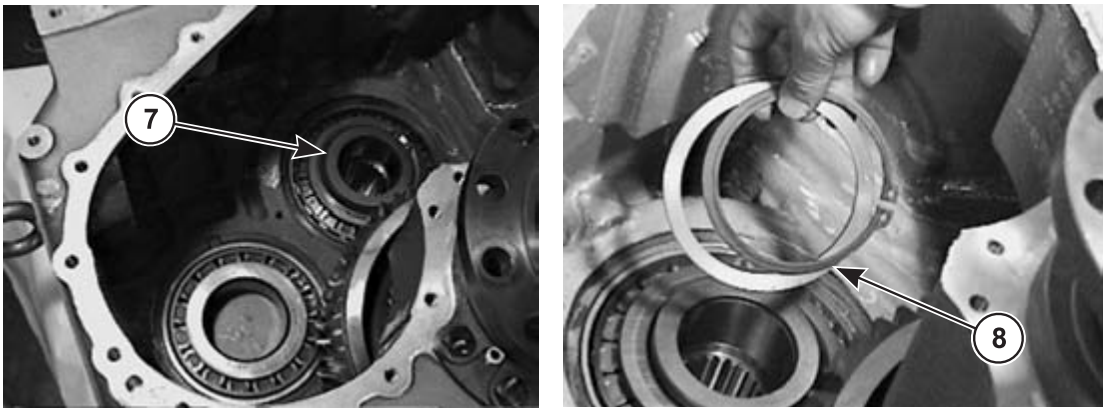


AR098-6557 AR099-6557

Figure 38. Lifting Primary (5) and Secondary (6) Clutch Shafts From Transmission Housing

Remove Input Drive Sleeve Assembly

1. Place a support (wooden block) under the input drive sleeve (7) so it is raised enough that the bearing cone no longer contacts the bearing cup. Use a brass drift punch to drive the bearing cone onto the input drive sleeve assembly. Once the spacer rotates freely by hand, remove the snap ring and spacer (8) from the input drive sleeve assembly.



AR101-6557 AR103-6557

Figure 39. Input Drive Sleeve (7)

2. Place a spacer inside the input drive sleeve. The spacer will protect the inner surface of the input drive sleeve during removal. Install a hydraulic ram in the transmission housing. Install a plate on the back surface of the transmission housing.

   Note: DO NOT remove the plug from the end of the input drive sleeve. It is difficult to remove without damaging it.

Input Drive Sleeve Removal

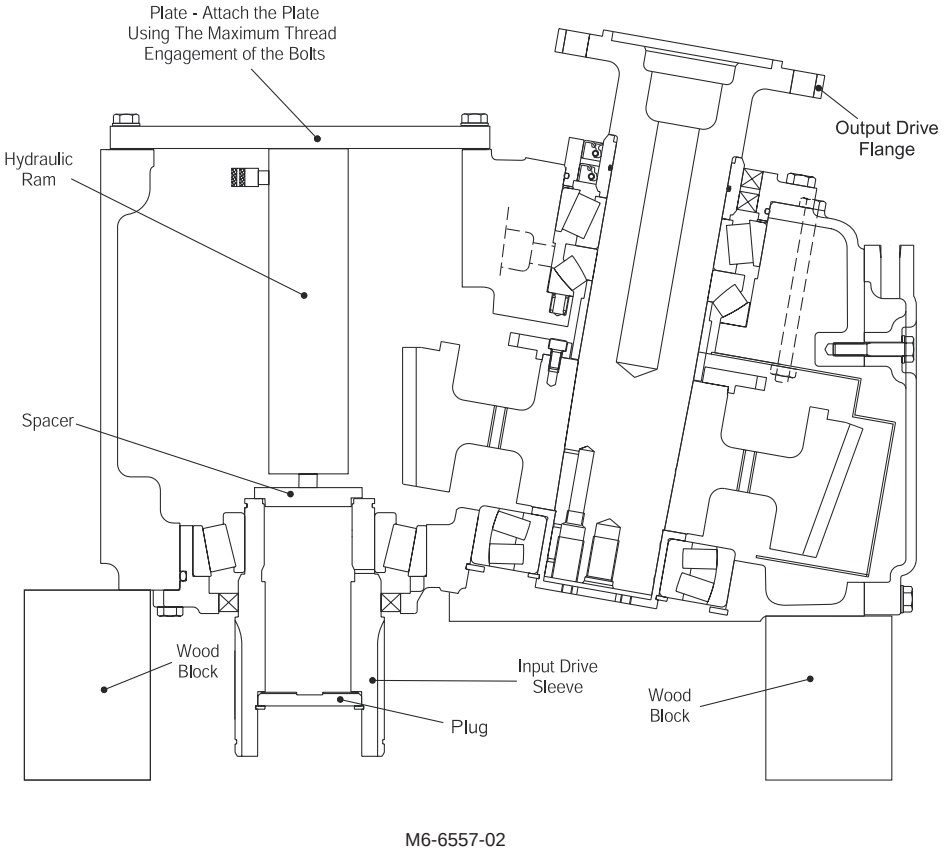
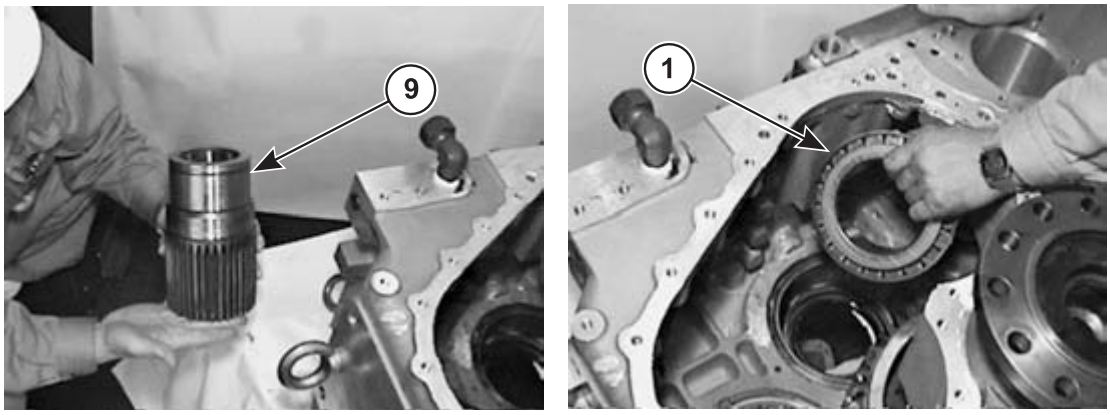


Figure 40. Input Drive Sleeve Removal

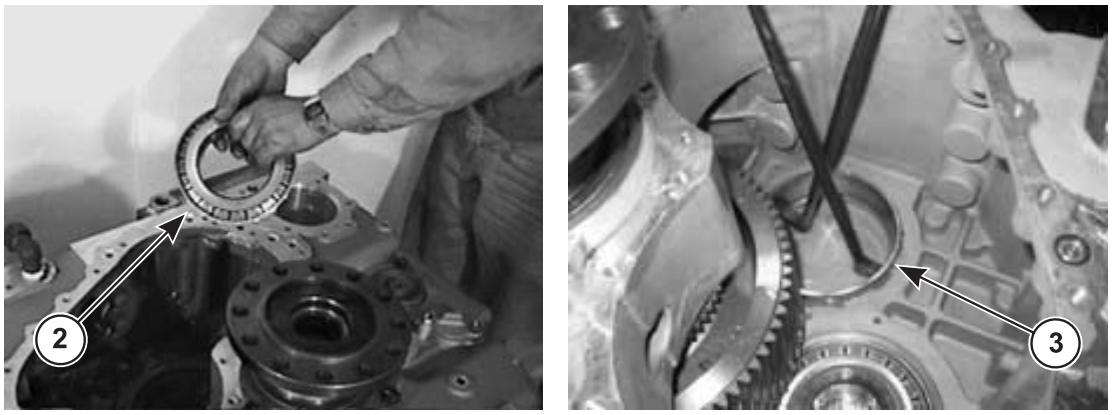
3. Press the input drive sleeve (9) out of the tapered roller bearing cone (1). Inspect the condition of the bearing components. Tag the components with identifying information.



AR108-6557 AR109-6557

Figure 41. Input Drive Sleeve (9) and Bearing (1)

4. Remove the secondary clutch shaft front tapered roller bearing cone (2) and bearing cup from the housing. The secondary clutch shaft front bearing cup (3) is retained with a light slip fit in the housing. Inspect the condition of the bearing components. Tag the components with identifying information.



AR107-6557 AR6557-037BE

Figure 42. Secondary Clutch Shaft Front Bearing Cone (2) and Cup (3) Removal

Remove Output Shaft

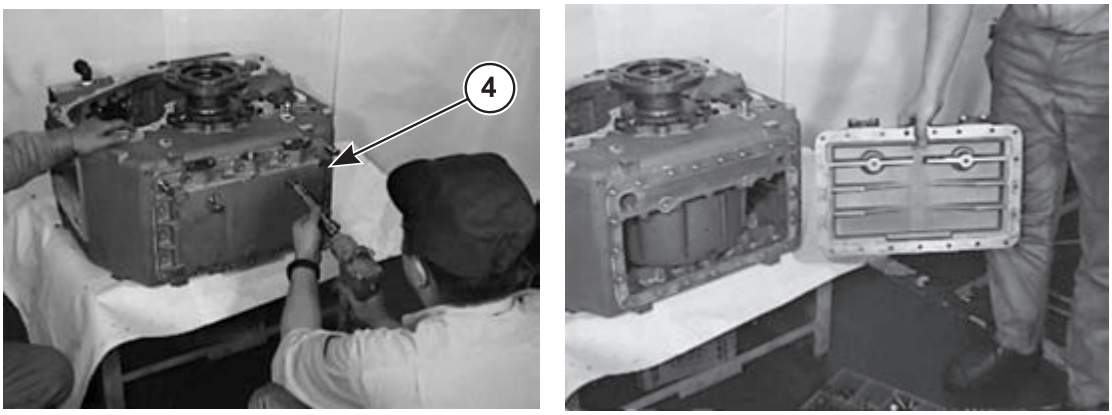
Remove Transmission Bottom Cover

1. Remove the retaining screws from the bottom cover (4) of the transmission housing. Be sure to remove the screws near the center of the cover.

⚠ IMPORTANT

The screws used to retain the bottom cover of the transmission are stainless steel.

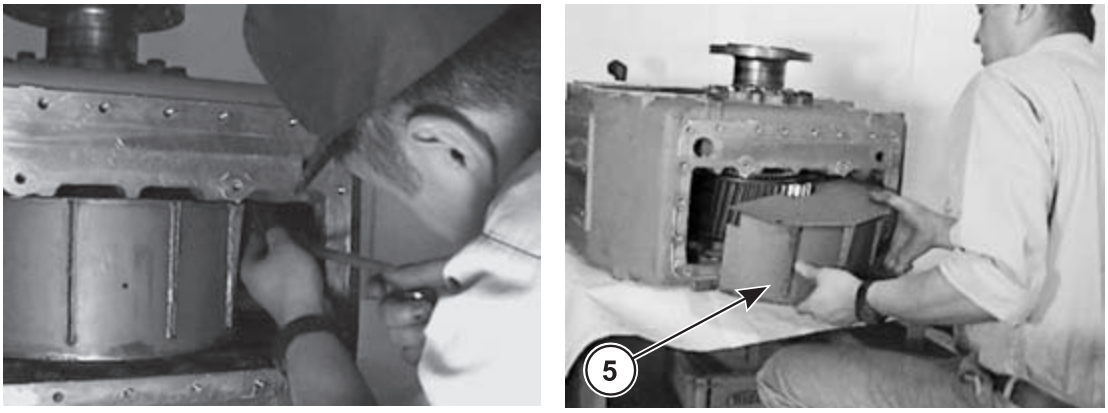
2. The transmission housing bottom cover is equipped with two pusher screw locations at opposite corners to assist in the removal. Thread a M10-1.5 x 60 mm fully threaded cap screw (lubricated) into a pusher screw location to push the bottom cover away from the transmission housing.



AR110-6557 R112-6557

Figure 43. Transmission Bottom Cover (4) Removal

3. Remove the retaining screws from the gear pan (5). Remove the gear pan.



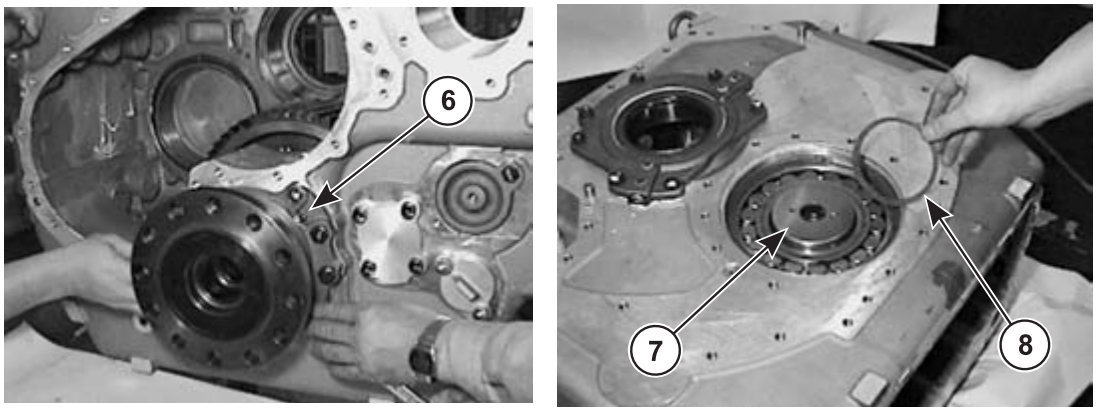
R114-6557 AR115-6557

Figure 44. Gear Pan (5) Removal

Remove Output Shaft

1. Place the transmission in an upright position. Be sure the transmission is supported securely. Use tool T-21482-21 to restrain the shaft. Remove the output seal carrier screws.

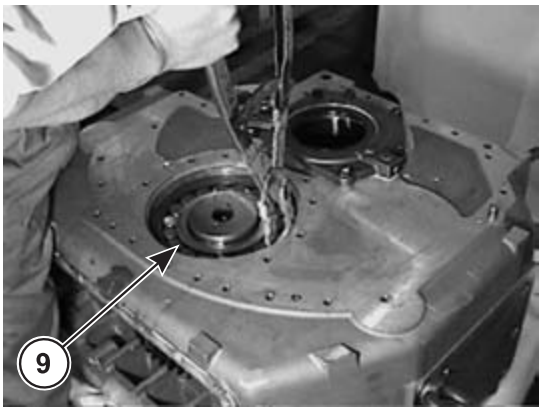
2. Rotate the transmission to place the front of the output shaft (7) at the top (output drive flange downward). Be sure transmission is supported securely. Remove the external snap ring (8) from the front of the output shaft.

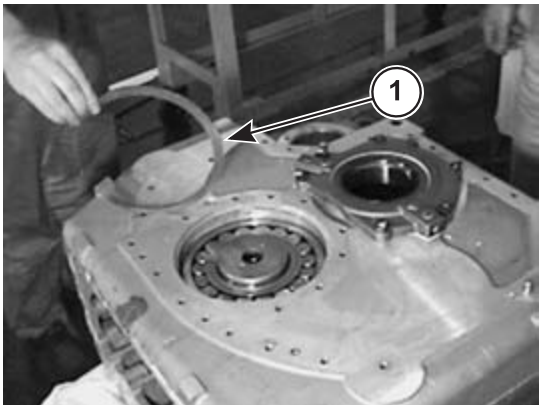


AR117A-6557 AR118-6557

Figure 45. Output Shaft Seal Retainer (9) and Output Shaft (7)

3. Remove the internal snap ring (1) from the transmission housing.

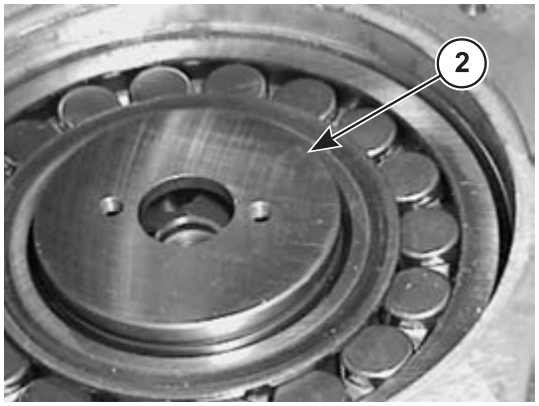


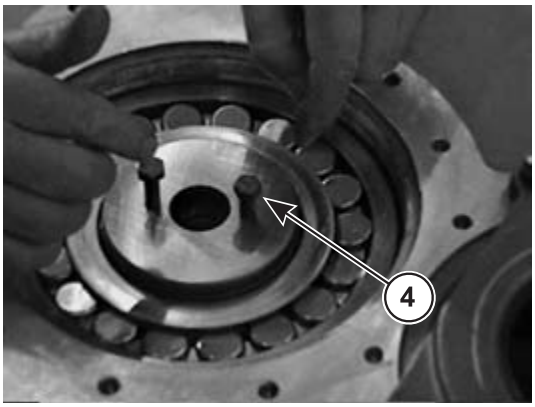


AR119-6557 AR120-6557

Figure 46. Internal Snap Ring Removal

4. Remove the output shaft front bearing carrier (2) from the output shaft. Insert two M8-1.25 cap screws (4) into the threaded screw locations of the bearing carrier end plate, and pull on the screws to remove the bearing carrier.





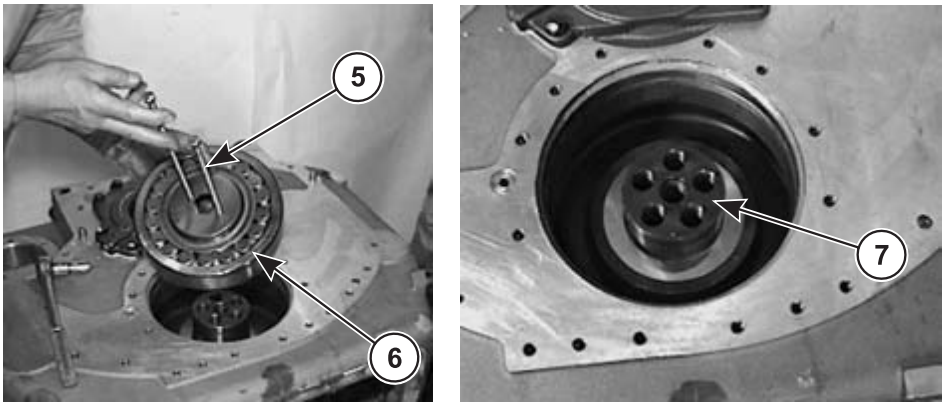
AR120A-6557 AR121-6557

Figure 47. Output Shaft Front Bearing Carrier (2)

⚠ CAUTION

Use caution in removing the spherical roller bearing from the end of the output shaft. If bearing alignment is maintained, the bearing can be pulled gently from the end of the shaft.

Remove the bearing from the bearing carrier only if parts replacement is required.



AR125-6557 AR126-6557

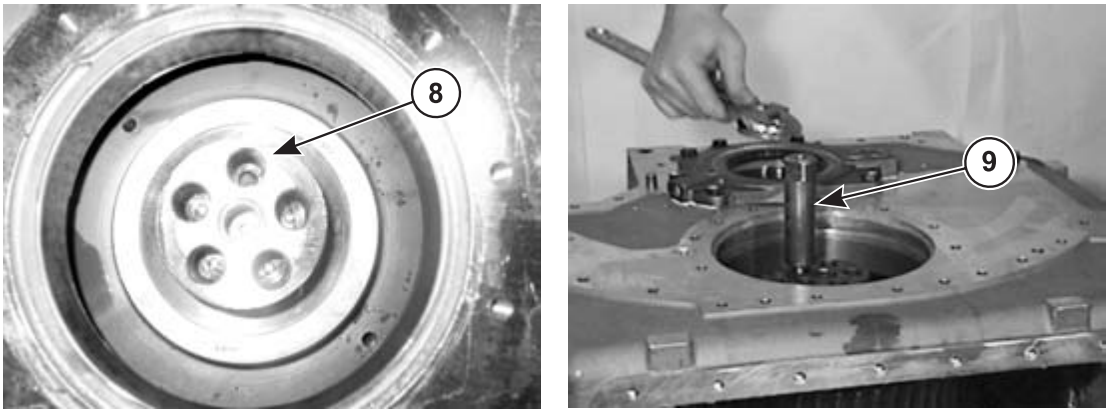
Figure 48. Output Shaft Front Bearing (6) Carrier Removal

5. Install special tool T-21482-21 restraining tool. Install the special tool (oil injection adapter tool) T-21482-8 into the end of the output shaft.

   a. Identify the location of the oil injection port (8). The proper port is the threaded hole in the end of the shaft that contains a continuing passage through the shaft to the shaft tapered surface at the output gear.

b. Fill the shaft passage with SAE 40W oil.

c. Wrap the threads of the oil injection adapter (9) with teflon sealing tape. Thread the oil injection adapter into the oil injection port in the end of the shaft.



AR6557053BE AR131-6557

Figure 49. Oil Injection Port (8) Location and Oil Injection Adapter Tool (9) Installation

6. Fill the oil injection adapter with SAE 40W oil. Lightly tap the oil injection adapter to remove air entrapped in the passage. Refill the passage with oil as required until the passage is filled and all traces of air are removed.

7. Insert two wooden blocks, about 20 mm (3/4 inches) thick between the side of the output gear and the transmission housing. The wood blocks will prevent damage to the trailing pump drive and driven gears when the output gear separates from the output shaft.

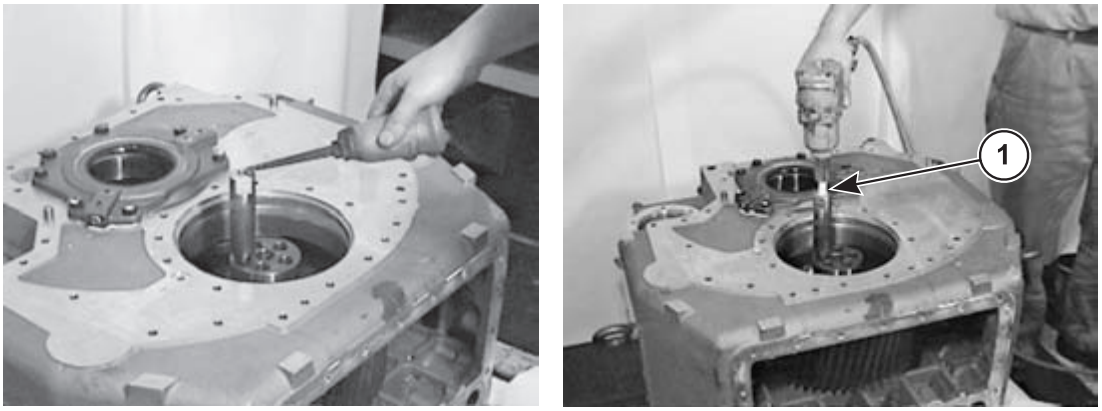
8. Wrap the threads of the injection adapter screw (1) with teflon sealing tape and install the screw into the oil injection adapter.

9. Hold the oil injection adapter to prevent rotation during operation and use an impact wrench to drive the screw into the oil injection adapter until the output shaft and output gear tapered surfaces separate.

   If the shaft and gear do not separate during the initial injection, repeat steps 6 through 9.

⚠ WARNING

The gear and shaft will separate with extreme force, potentially causing great physical harm. Use EXTRA CAUTION and proper safety procedures.



R131A-6557 AR132-6557

Figure 50. Filling Oil Injection Adapter with Oil

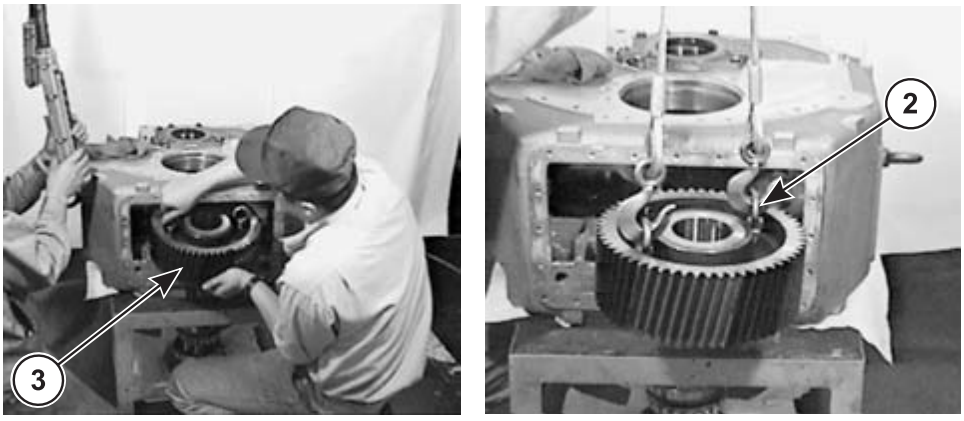
10. Thread an M20-1.5 eyebolt (2) into the center hole in the end of the output shaft and support the shaft from above with a crane. The eyebolt must be able to fit through the bore (85 mm) of the output gear (3). The hooks of the crane must be removable after the shaft is lowered from the transmission. Other suitable equipment may be substituted if available.

    a. Remove restraining tool T-21482-21
    b. Remove the remaining screws from the shaft seal retainer.
    c. Lower the output shaft assembly (4) out of the transmission housing through the bore of the output gear.

AR133-6557 AR133A-6557

Figure 51. Lowering Output Shaft (4) Out of Transmission

11. Slide the output gear (3) out of the transmission housing until two M10-1.5 eyebolts (2) can be installed into the gear to allow it to be lifted with a crane. Remove the output gear from the transmission housing.

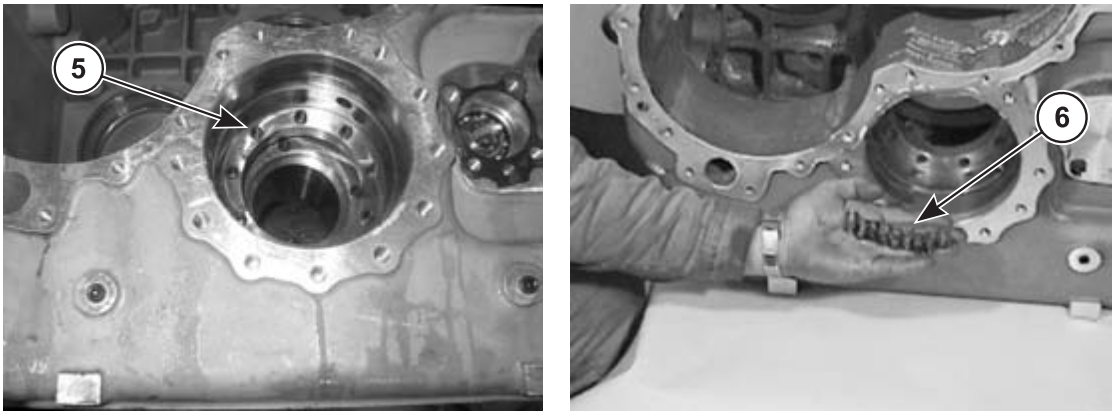


135-6557 136-6557

Figure 52. Removing Output Gear From Transmission

12. Place the transmission in the upright position. Be sure transmission is supported securely.

13. Remove the nine coil springs (6) from behind the output shaft spherical roller bearing cup in the transmission housing (5).



AR6557-060BE AR141-6557

Figure 53. Output Shaft Spherical Bearing Coil Spring (6) Removal

14. Remove the trailing pump drive gear from the output gear only if parts replacement is required.
    a. A spacer is used between the trailing pump drive gear and the output gear on transmissions .
    b. Refer to Output Shaft Disassembly information of this manual for detailed shaft disassembly information.

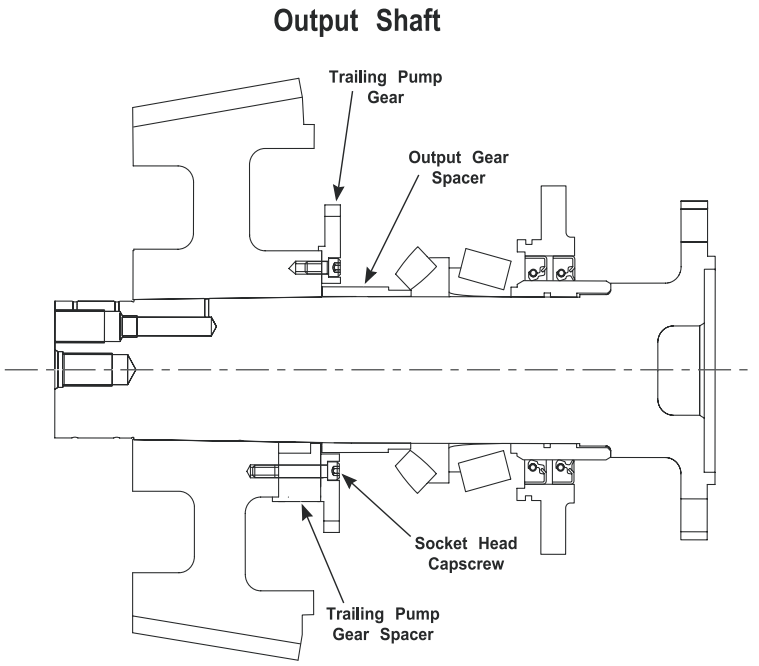


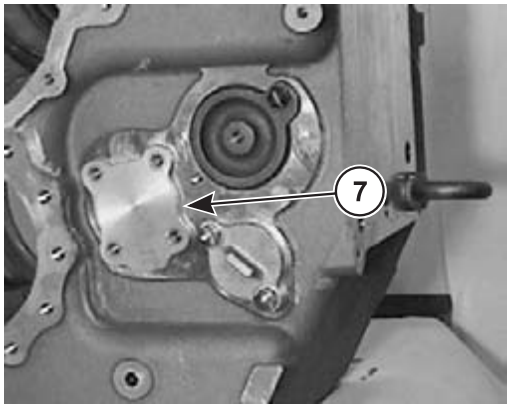
Figure 54. Output shaft Component Identification, Location and Variation

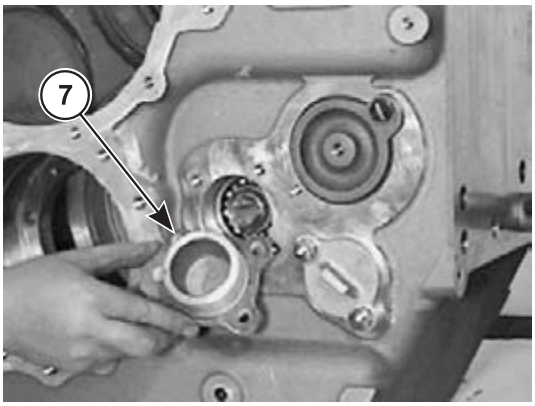
Remove Trailing Pump and Shaft

Remove Pump/Cover and Shaft

1. Place the transmission in the upright position. Be sure transmission is supported securely.

2. Remove the trailing pump/cover (7) from the rear of the transmission.





AR148-6557 AR149-6557

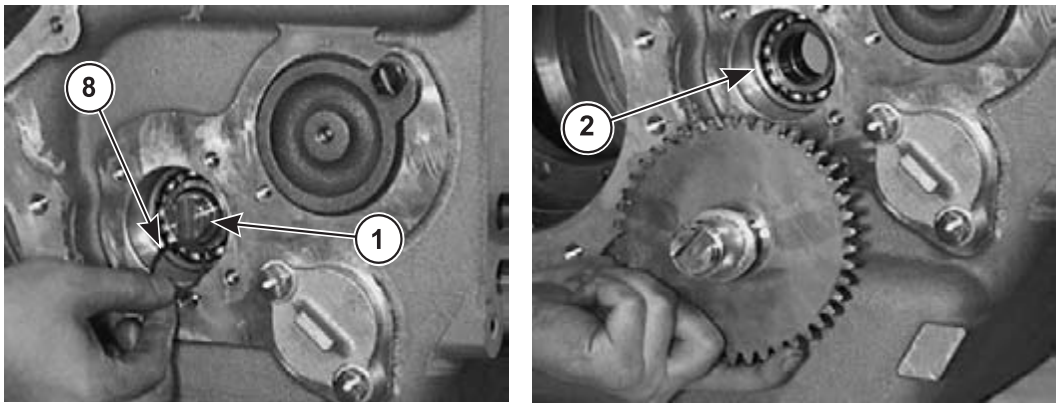
Figure 55. Trailing Pump Cover (7) Removal

3. Remove the external snap ring (8) from the trailing pump driven shaft.

4. Use special tool T-21482-17 to drive the shaft out of the bearings and into the housing, using M10 x 1.5 x 50 mm screws in opposing trailing pump holes.

⚠ CAUTION

Use extreme caution when removing the trailing pump drive shaft to prevent damage to the drive slot in the end of the shaft. The trailing pump drive shaft and gear are not serviced separately. The trailing pump drive gear and shaft are serviced as an assembly (as a single part number).

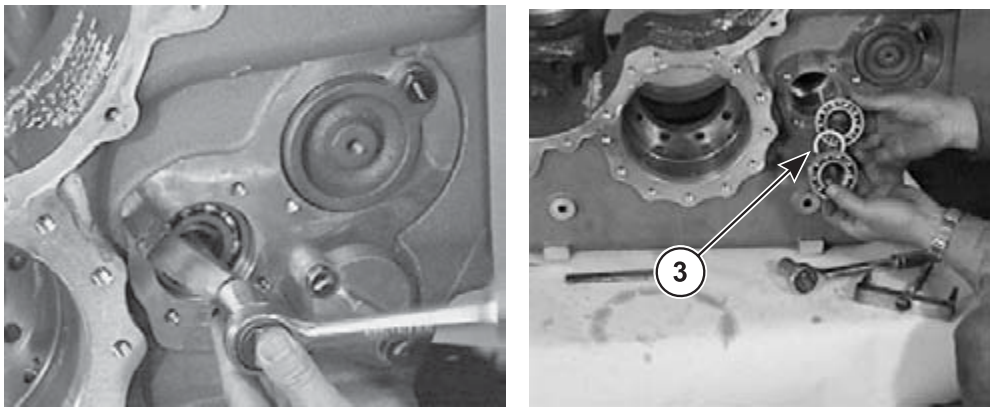


AR151-6557 AR153-6557

Figure 56. Trailing Pump Shaft Removal

Bearing Removal

Pull the trailing pump shaft bearings and spacer (3) out the back of the transmission housing. The spacer is located between the two ball bearings.

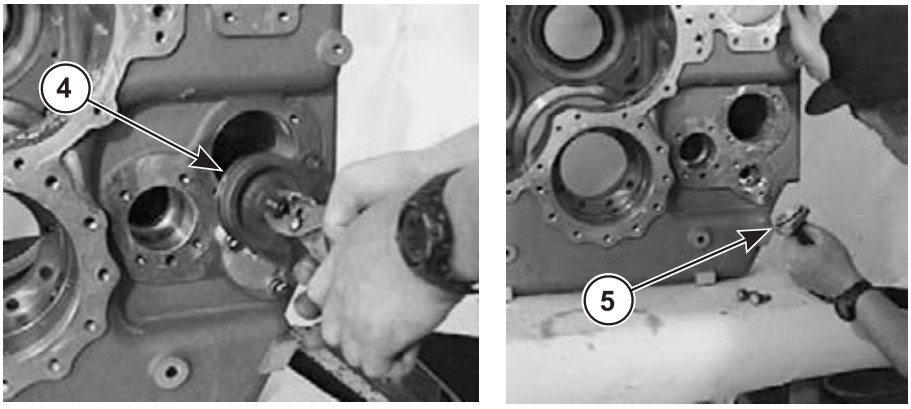


R156-6557 AR157-6557

Figure 57. Trailing Pump Shaft Bearing and Spacer (3) Removal

Other Components

. Remove the governor cover (4) and trailing pump suction strainer cover (5). Each cover is sealed with an O-ring.



AR158-6557 AR160-6557

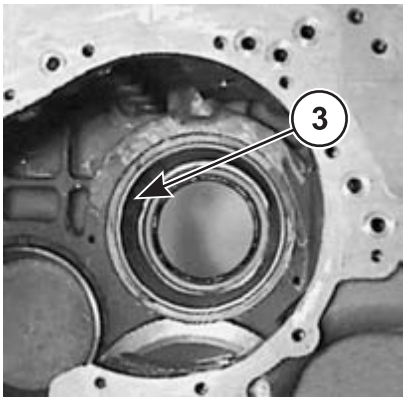
Figure 58. Governor Cover (4) and Trailing Suction Strainer Cover (5)

Input Shaft Seal

Remove the input shaft seal from the main housing.

Input Shaft Front Bearing Cup

If the input shaft front bearing cup (3) replacement is required, weld a bead midway around the circumference of the bearing cup with an electric welder, causing it to shrink for removal.



AR145-6557

Figure 59. Input Shaft Front Bearing Cup (3) Removal

Primary and Secondary Clutch Shaft, Output Shaft, and Ditch Plate Disassembly

Primary Clutch Shaft Disassembly

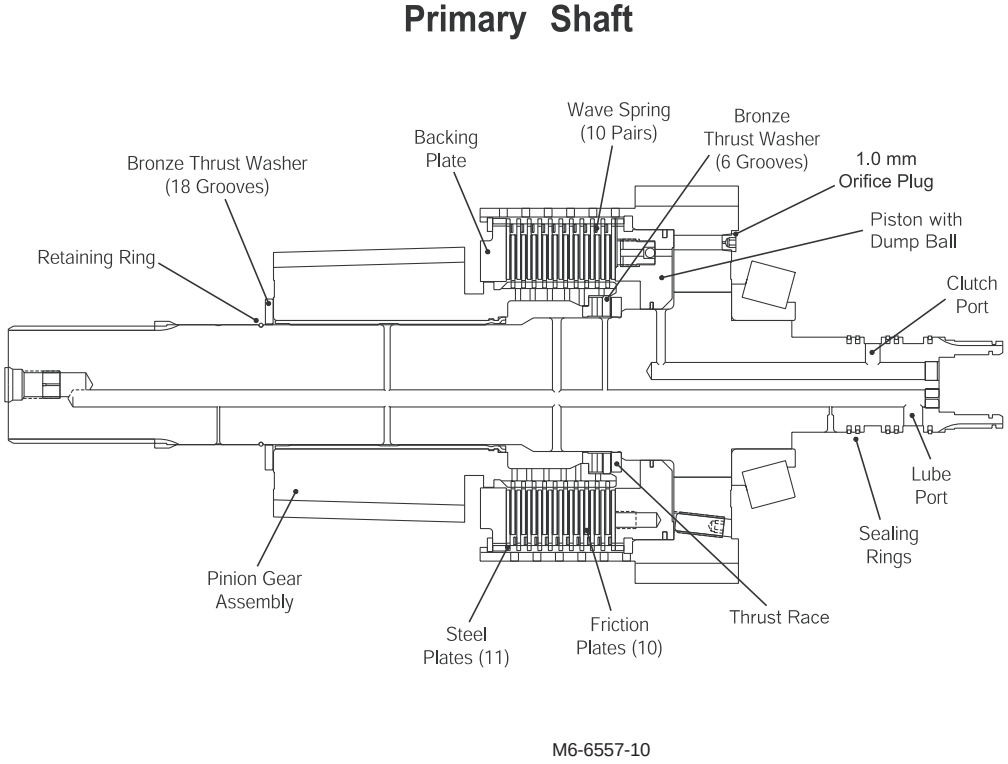
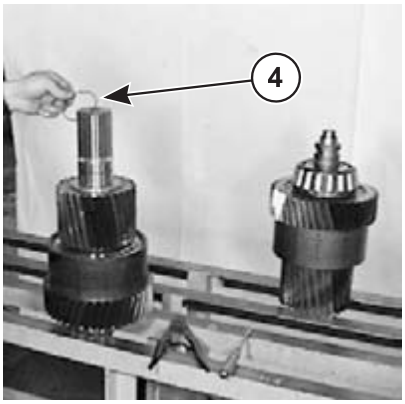


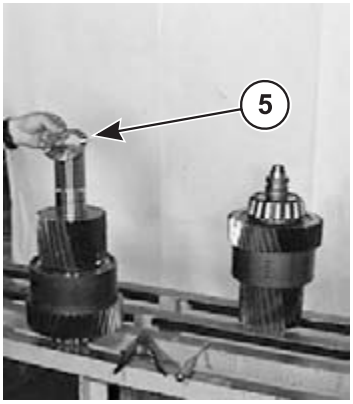
Figure 60. Primary Clutch Shaft Component Identification and Location

1. Position the shaft with the clutch sealing rings downward.
2. Remove round retaining ring (4) from the shaft.

3. Remove the bronze thrust washer (5).

Note: The rear bronze thrust washer is equipped with 18 radial grooves (both sides) around the thrust washer for lubrication purposes.



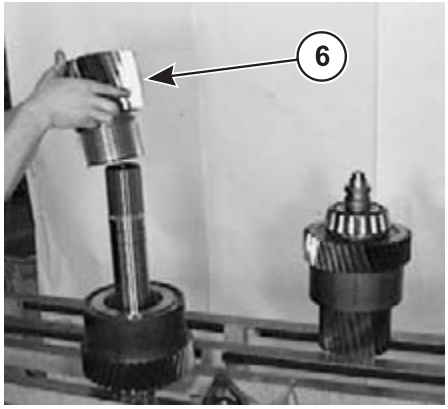


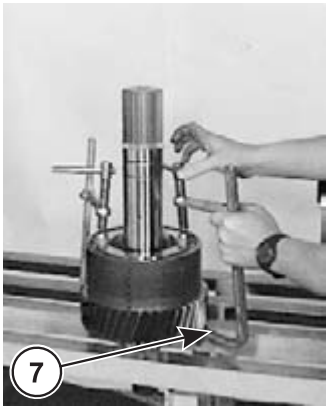
AR182-6557 AR184-6557

Figure 61. Retaining Ring (4) and Bronze Thrust Washer (5)

4. Remove the pinion assembly (6). Tag the pinion assembly with identifying information. This will ensure the gear will be installed in the same location where it was removed.

5. Install two clamps (7) on the transfer gear and backing plate to compress the clutch wave springs. Compress the clutch until the internal retaining snap ring in the clutch can be removed.



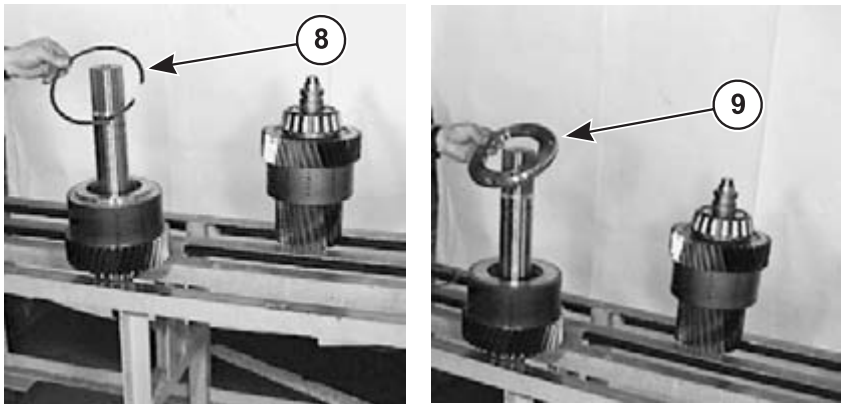


AR183-6557 AR186-6557

Figure 62. Pinion Assembly (6) and Clamping (7) Clutch Backing Plate

6. Remove the internal snap ring (8) from the clutch (retains the clutch backing plate). Remove the bar clamps from the clutch assembly.

7. Remove the clutch backing plate (9) from the clutch.

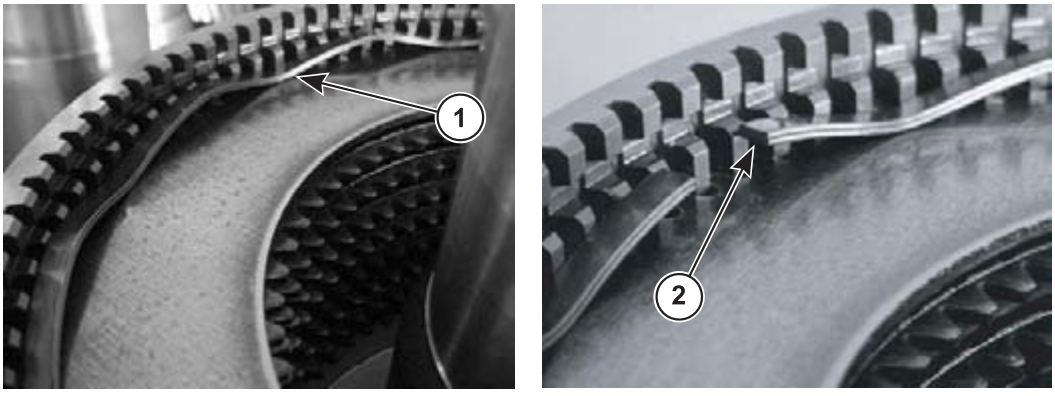


AR187-6557 AR188-6557

Figure 63. Internal Snap Ring (8) and Clutch Backing Plate Removal

8. Remove the steel clutch plates (quantity 11), the friction clutch plates (quantity 10), and the wave springs (1) (quantity 20).

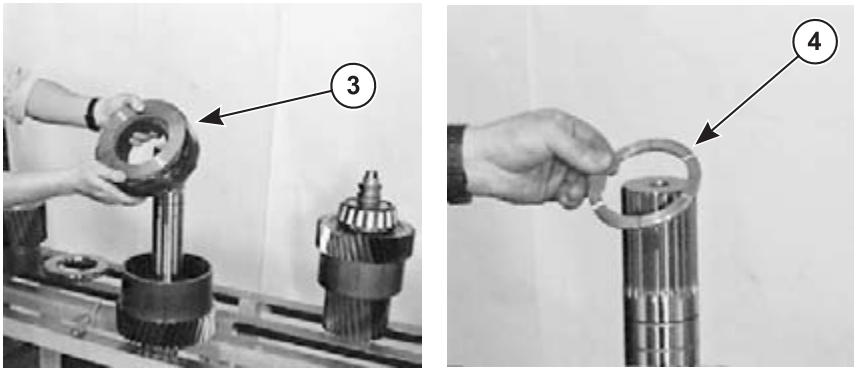
Note: Some early units use only a single wave spring between clutch plates. There are only 10 wave springs on these units.



ARMVC026FGS ARMVC028FGS

Figure 64. Clutch Wave Springs (1 and 2)

9. Remove the inner bronze thrust washer (4). The inner bronze thrust washer (closest to the clutch piston) has six radial grooves on each side.



AR188C-6557 AR188D-6557

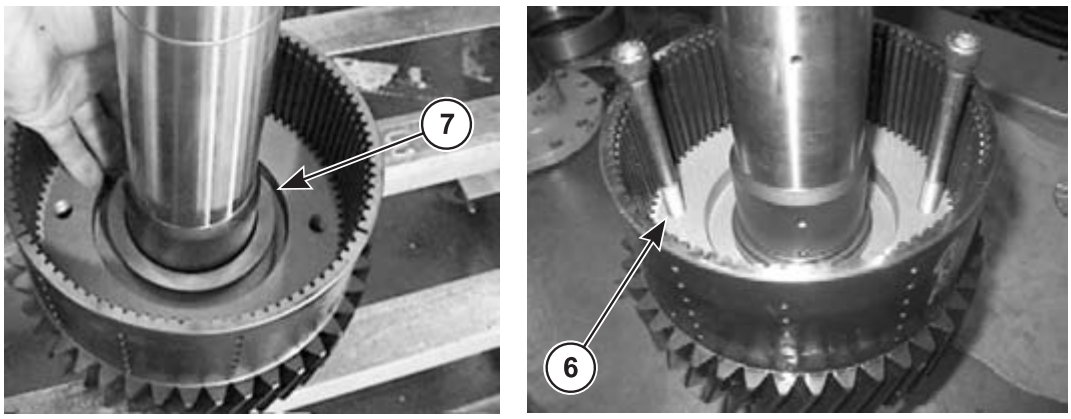
Figure 65. Clutch Plates (3) and Bronze Thrust Washer (4)

10. Remove steel thrust race (7) from the clutch. The steel thrust race is located below the bronze thrust washer.

Note: Rotating the thrust race during removal will ease the process.

11. Some clutch pistons are equipped with threaded holes to insert pulling screws (8), assisting in the removing the clutch piston. Thread two M12-1.75 x 200 mm cap screws into the clutch piston. Remove the clutch piston from the clutch.

Note: If the clutch piston does not have threaded holes compressed air can be used to remove the piston.

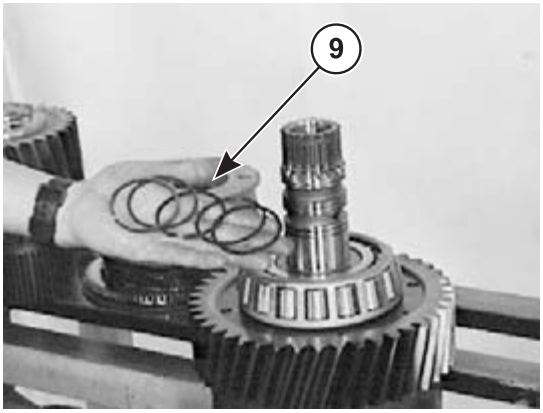


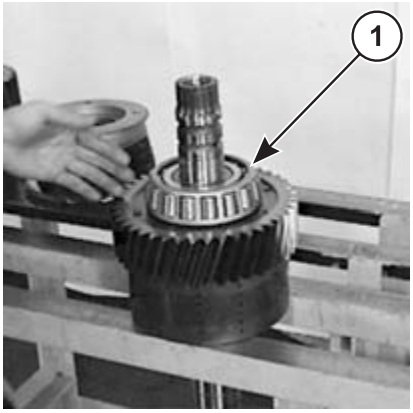
191-6557 6557066BE

Figure 66. Steel Thrust Race (7) and Clutch Piston (6) Removal

12. Invert the shaft, placing the rear end of the shaft upward. Remove the clutch piston sealing rings (9) from the end of the shaft.

13. Removal of the rear tapered roller bearing (1) requires destruction of the bearing to facilitate removal. **DO NOT** remove the rear bearing unless replacement is required.





193-6557 193A-6557

Figure 67. Piston Sealing Rings (9) and Clutch Shaft Rear Bearing (1)

Secondary Clutch Shaft Disassembly

1. Position the shaft with the clutch sealing rings downward.

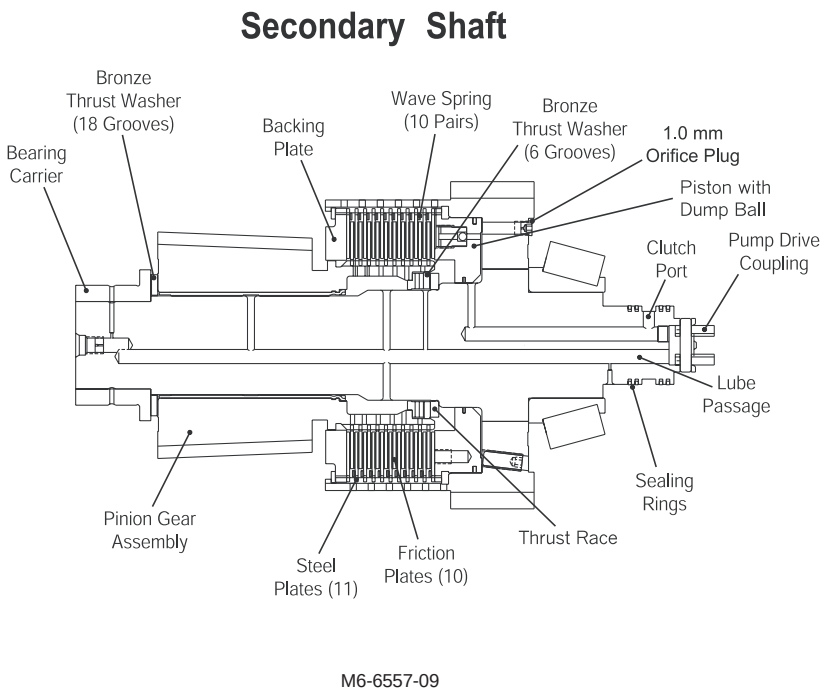


Figure 68. Secondary Clutch Shaft Component Identification and Location

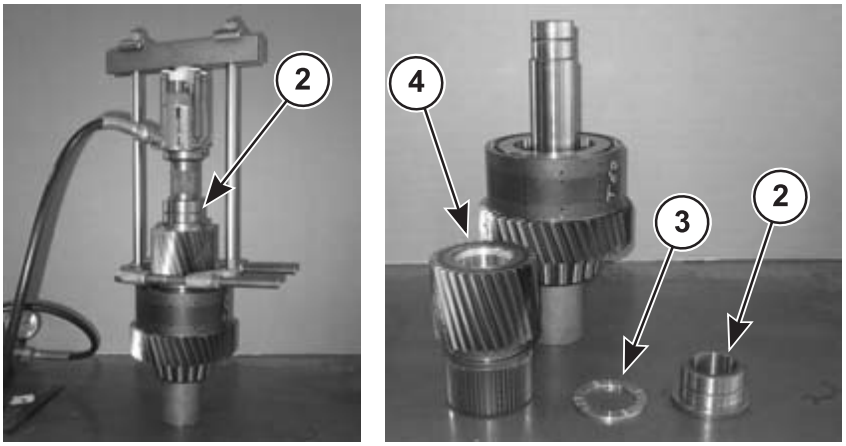
2. Remove the rear tapered roller bearing from the bearing carrier. The bearing is a slip fit on the bearing carrier. Remove the bearing carrier (2) from the end of the shaft. Use the pinion to pull the bearing carrier, bronze thrust washer and bearing carrier simultaneously.

⚠ CAUTION

Use caution to prevent damage to bronze thrust washer when removing bearing carrier from the shaft assembly.

Note: The rear bronze thrust washer is equipped with 18 radial grooves (both sides) around the thrust washer for lubrication purposes.

3. Remove the pinion/bushing assembly (4). Tag the pinion assembly with identifying information. This will ensure the gear will be installed in the same location where it was removed.

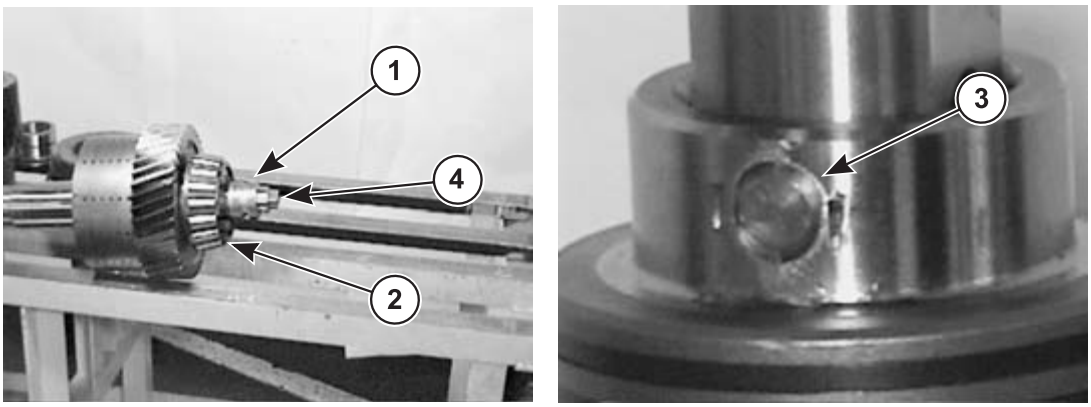


ARR6557-1006BE ARR6557-1007BE

Figure 69. Bearing Carrier (2), Pinion (4), and Thrust Washer (3) Removal

4. Repeat steps 5 through 13 as previously shown for Primary Clutch Shaft Disassembly

5. **DO NOT** remove the drive pin (3) from pump drive coupling (4) unless part replacement is required. The pump drive coupling pin is retained by staking in two locations at both ends of the pin.



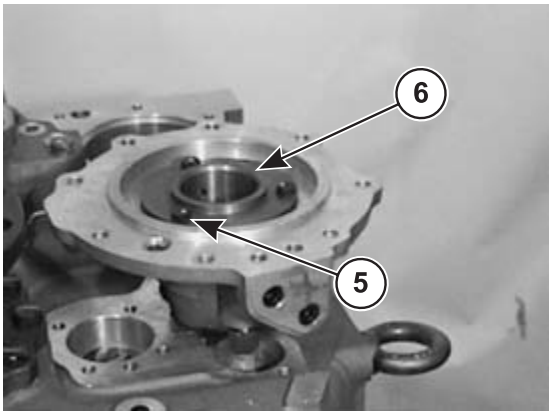
197A-6557 170-6557

Figure 70. Piston Sealing Rings (1), Clutch Shaft Rear Bearing (2), and Pump Drive Pin (3)

Primary and Secondary Clutch Shaft Insert Removal

Note: Complete the following procedure only if part replacement is required. Secondary clutch shaft insert shown. The insert removal process is identical for primary clutch shaft insert.

1. Remove the screws (5) retaining the shaft rear cover insert (6).
2. Weld a washer in the bore of the steel insert with an arc welder.
3. Heat the aluminum cover to 120°C (250°F).
4. Pull the insert from the cover.



R283-6557

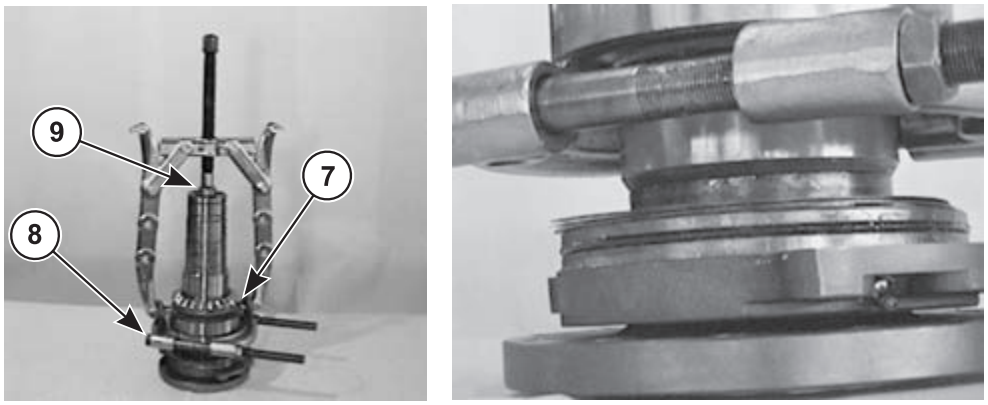
Figure 71. Clutch Shaft Insert (6), Secondary Clutch Shaft Inset Shown

Output Shaft Disassembly

1. Slide the oil seal carrier away from the output shaft bearings (7) until it contacts the output flange.

2. Place a split bearing puller (8) around the shaft between the output shaft seal carrier and the tapered roller bearing on the shaft assembly. The puller will remove both bearings simultaneously from the shaft. Place a shaft protector (9) between the puller assembly and the end of the shaft to protect the shaft end during disassembly.

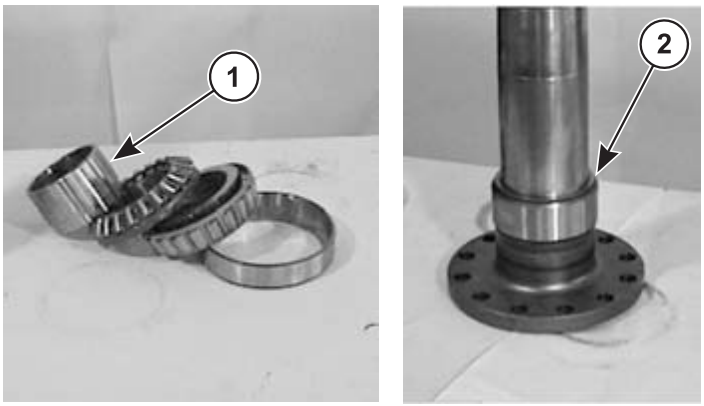
3. Ensure the bearing puller is properly placed to prevent damage to the bearings and other components of the shaft during disassembly.



AR214-6557 R213-6557

Figure 72. Output Shaft Bearing (7) Removal

4. Tag the components (1) with identifying information. Remove the output shaft seal sleeve (2) from the shaft.



AR215-6557 AR220A-6557

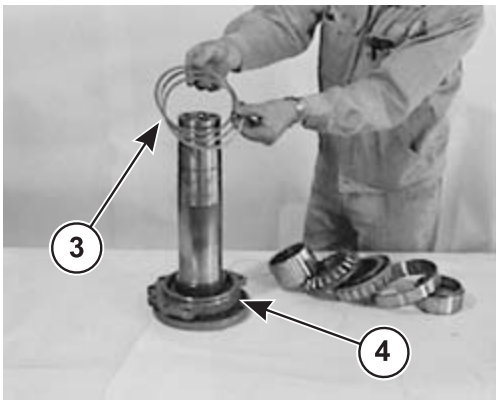
Figure 73. Output Shaft Components (1) and Seal Sleeve (2)

5. The seal sleeve (2) uses an O-ring on the inner surface, sealing the sleeve to the shaft.

AR216-6557 ARMVC007FGS

Figure 74. Output Shaft Seal Sleeve (2)

6. Remove the bearing shims (3), and output seal carrier (4). Tag the components with identifying information.



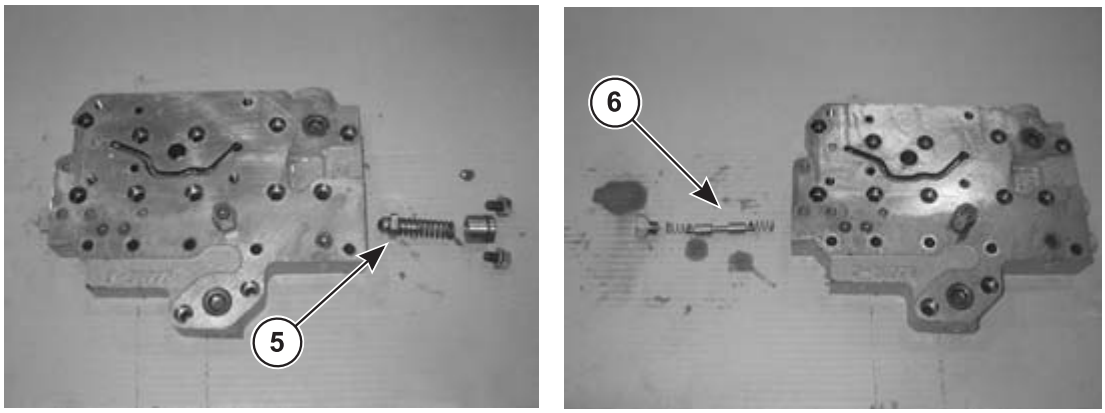
AR218-6557

Figure 75. Output Shaft Bearing Shims and Seal Carrier (4)

Ditch Plate Disassembly

1. Remove the lubrication oil pressure relief valve (5) by removing the two hex head cap screws and washers. Thread a M8-1.25 screw into the sealing plug and pull it from the ditch plate. Remove the spring, retainer, and steel ball from the bore of the ditch plate.

2. Remove the hex head screw and sealing washer from the lubrication oil priority valve (6). Remove the spring, valve spool, and the remaining spring from the bore in the ditch plate.



6557017BE 6557016BE

Figure 76. Ditch Plate, Pressure Relief Valve (5), Lube Priority Valve (6)

Note: Some early units may have a built in relief valve.

Selector Valve Assembly -- Electric Valve

⚠ CAUTION

The steel ball is under pressure from the spring. Care must be taken when removing the cover and orifice plate to prevent loss of the steel ball.

1. Loosen and remove four of M8 x 25 socket head capscrews, and remove orifice plate cover and gasket.

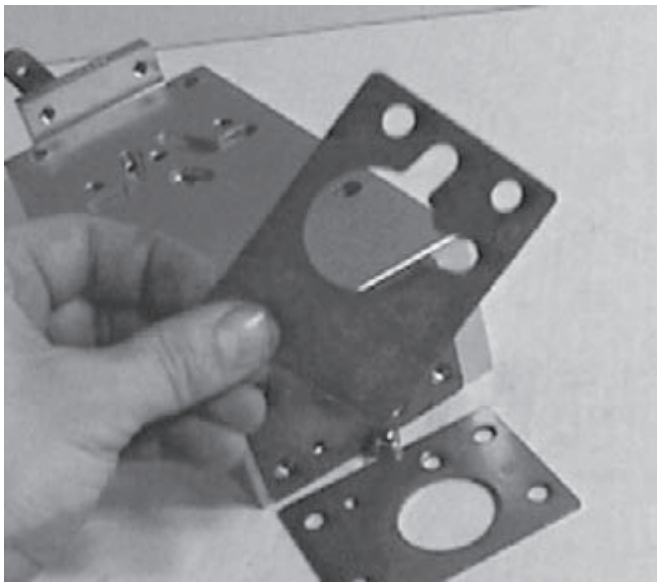


Figure 77. Removing Orifice Plate Cover Gasket

2. Remove orifice plate.

3. Remove steel ball and neutral pressure regulating spring.

4. Remove orifice plate gasket.

5. Remove screen. Remove rate-of-rise piston. Note that shims are located between the piston and springs.

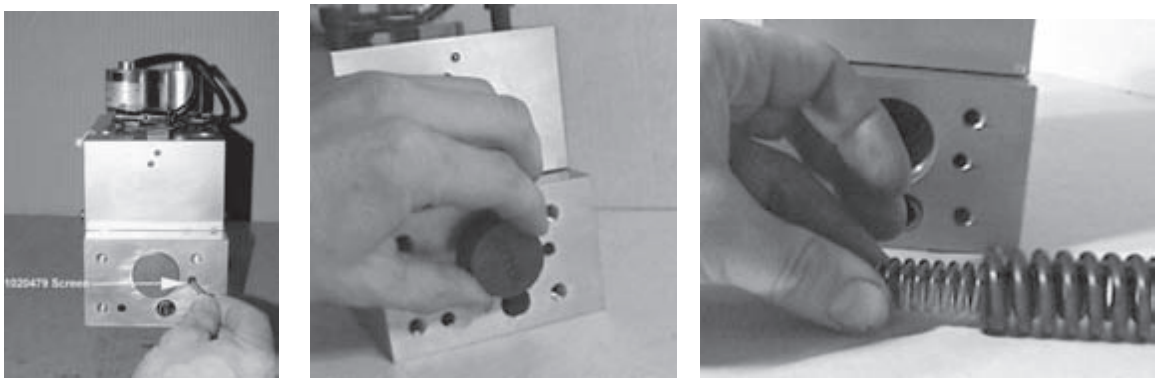


Figure 78. Screen, Rate of Rise Piston, and Regulator Springs

6. Remove pressure regulating springs.

7. Remove pressure regulating piston with an external retaining ring pliers.

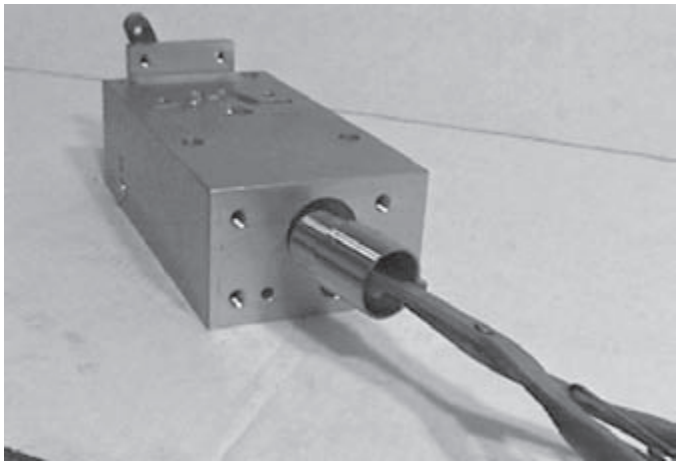


Figure 79. Removing Regulating Piston with Pliers

8. Remove external retaining ring from the lever end of the stem.

9. Loosen the clamping nut and remove the control lever from the stem. It may be necessary to splay the lever to be able to remove it. **DO NOT** apply any impact force to the lever, as the stem or dog-point setscrew might get damaged.

10. Remove the washer and spring from the stem.

11. Remove four of M8 x 25 socket head capscrews.

12. Remove the cover assembly with the gasket from the valve body.

13. Remove the O-ring and oil seal from the cover assembly.

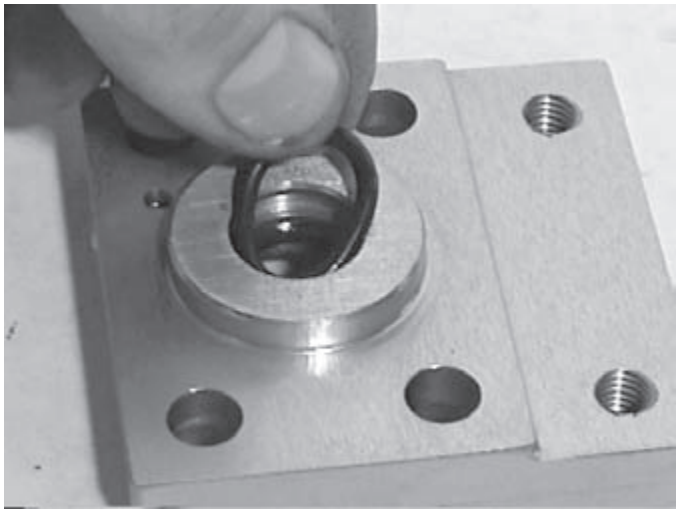


Figure 80. Removing O-ring from Cover

14. Remove the two electrical switches from the sides of the valve body and the two steel balls from each of the switch bores in the valve body (some models).

15. Remove the detent setscrew, spring, and steel ball from the valve body.

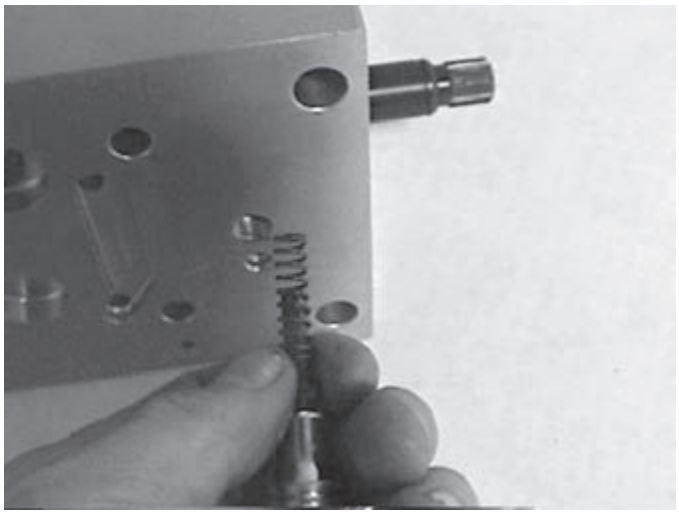


Figure 81. Removing Detent Setscrew and Spring

16. Remove the dog-point setscrew. Note that the setscrew is retained with MA908 threadlocker.

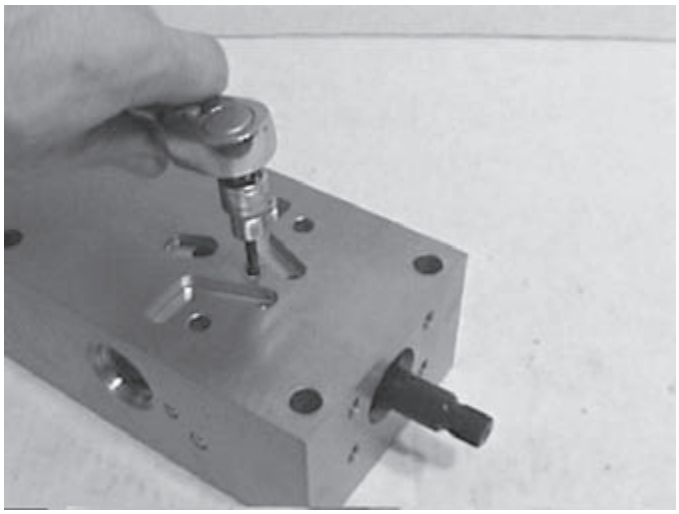


Figure 82. Removing Dog-point Setscrew

17. Remove the stem from the valve body partially.

18. Remove the thrust washer from the stem.

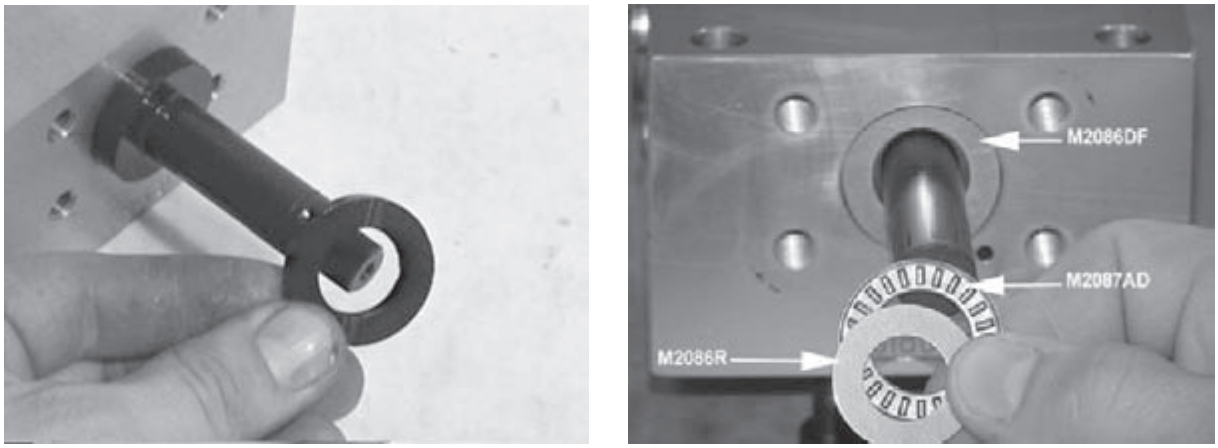


Figure 83. Removing Thrustwasher (Two Types are Shown)

19. Remove the stem from the valve body.

20. Remove the roll pin (retains the shuttle ball seat) with a needle-nose pliers.

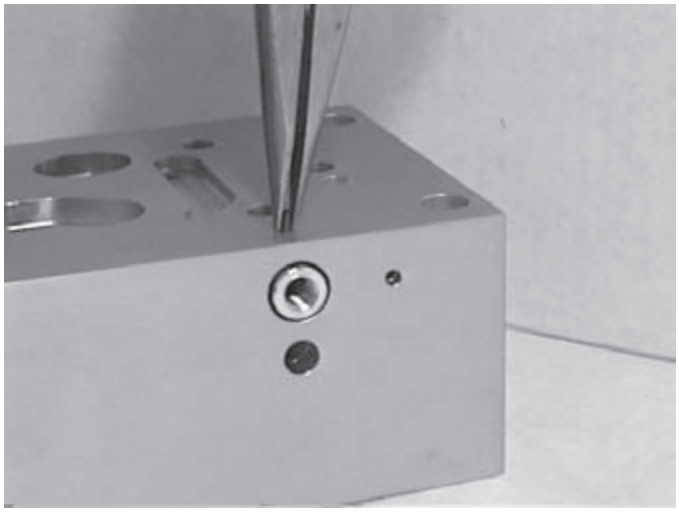


Figure 84. Removing Roll Pin Retaining Shuttle Seat

21. Thread a M8x1.25 screw (one of the cover screws works well) into the seat and remove it from the valve body.

22. Remove the shuttle ball from the valve body.

Disassembly of Upper Valve Body Half (Electric Section)

1. Remove the Weatherpak connector from the valve body by sliding it in the direction of the opening in the shroud.

2. Mark the wires with the location letters that are on the Weatherpak connector. Open the end of the Weatherpak connector to allow removal of the pins and wires.

3. Remove the pins (for the wires of all but one solenoid) from the Weatherpak connector using the extraction tool.The tool is Packard Electric P/N 12014012.

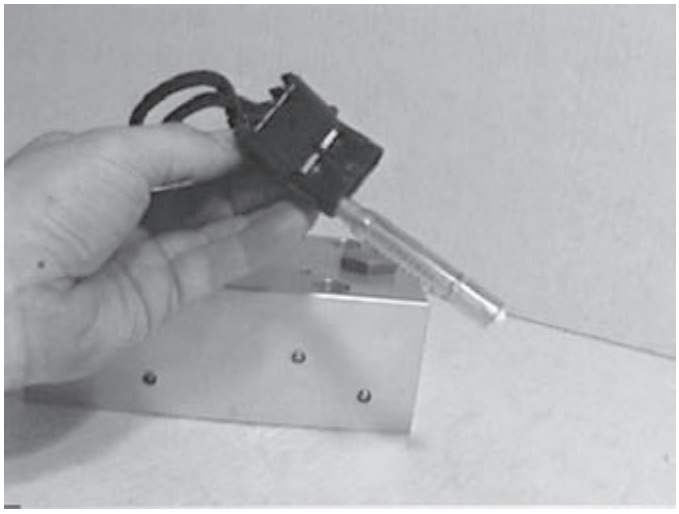


Figure 85. Removing Wires using Extraction Tool

4. Mark the two solenoids for location identification and remove them.

5. Remove the third (neutral) solenoid (units with hydraulic lock) or plug (units without hydraulic lock).

6. Remove the filter screen from the valve body.

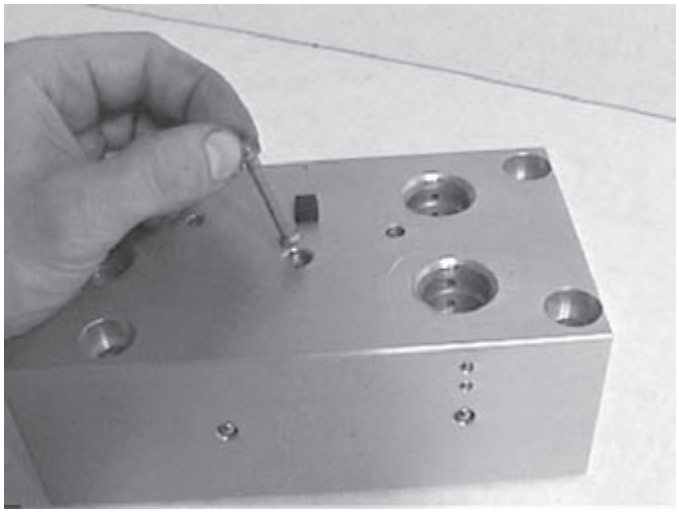


Figure 86. Removing Filter Screen

7. Remove the two socket head O-ring plugs from the bores in the end of the valve body.

8. Remove the two spools from the valve body.

9. Remove one dowel pin and spring from each of the spools (hydraulic lock units only).

10. Remove the spool return spring and dowel pin from the bottom of each of the spool bores in the valve body.

1017555 Trolling Valve (Optional Equipment)

1. Remove the trolling valve attaching screws.

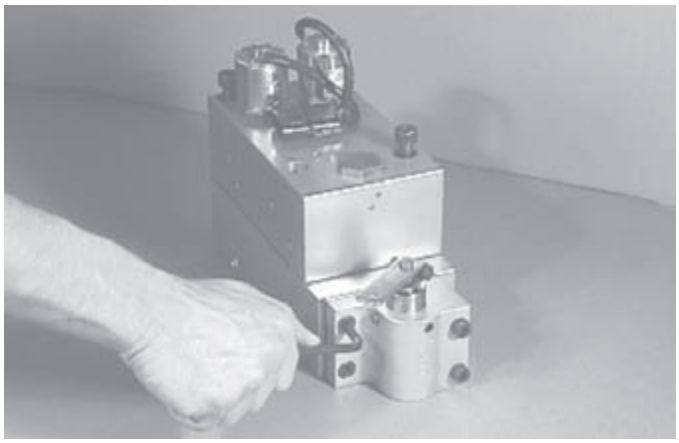


Figure 87. Removing Trolling Valve Attaching Screws

⚠ CAUTION

Steel ball is under pressure from the spring. Care must be taken when removing the trolling valve and orifice plate to prevent loss of steel ball.

2. Remove the trolling valve from control valve.

3. Remove the gaskets, orifice plate, and steel ball from control valve.

4. Remove the screw and nut clamping the lever to the stem.

5. Remove the lever from the stem. It may be necessary to splay the lever to be able to remove it. **DO NOT** apply any impact force to the lever, as the stem or dog-point setscrew might be damaged.

6. Remove the detent setscrew, spring, and detent ball.

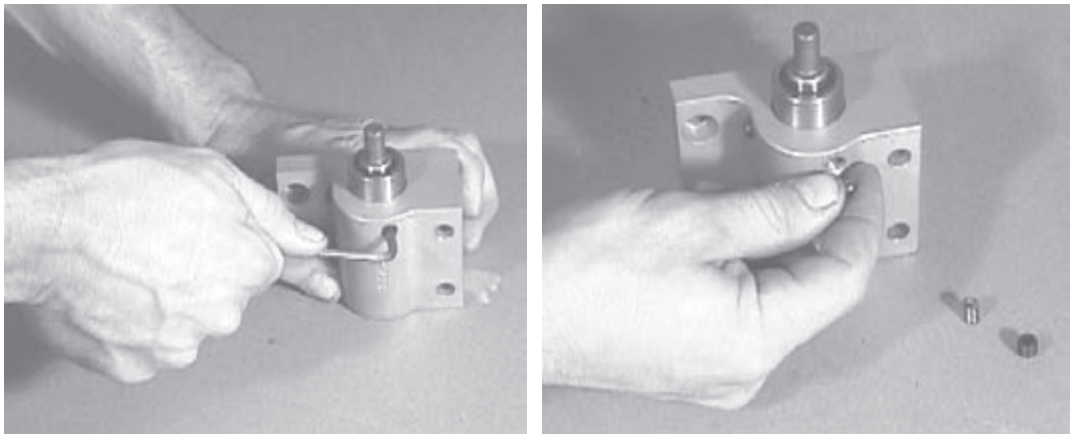


Figure 88. Removing Detent Setscrew (left) and Detent Spring and Ball (right)

7. Remove the dog-point setscrew from the valve body.

Figure 89. Removing Dog-point Setscrew

8. Slide the stem and adapter out of the valve body together as one piece. Push the stem out of the adapter so the spring end of the stem exits the adapter first. Note that the inner spring will come out with the stem.

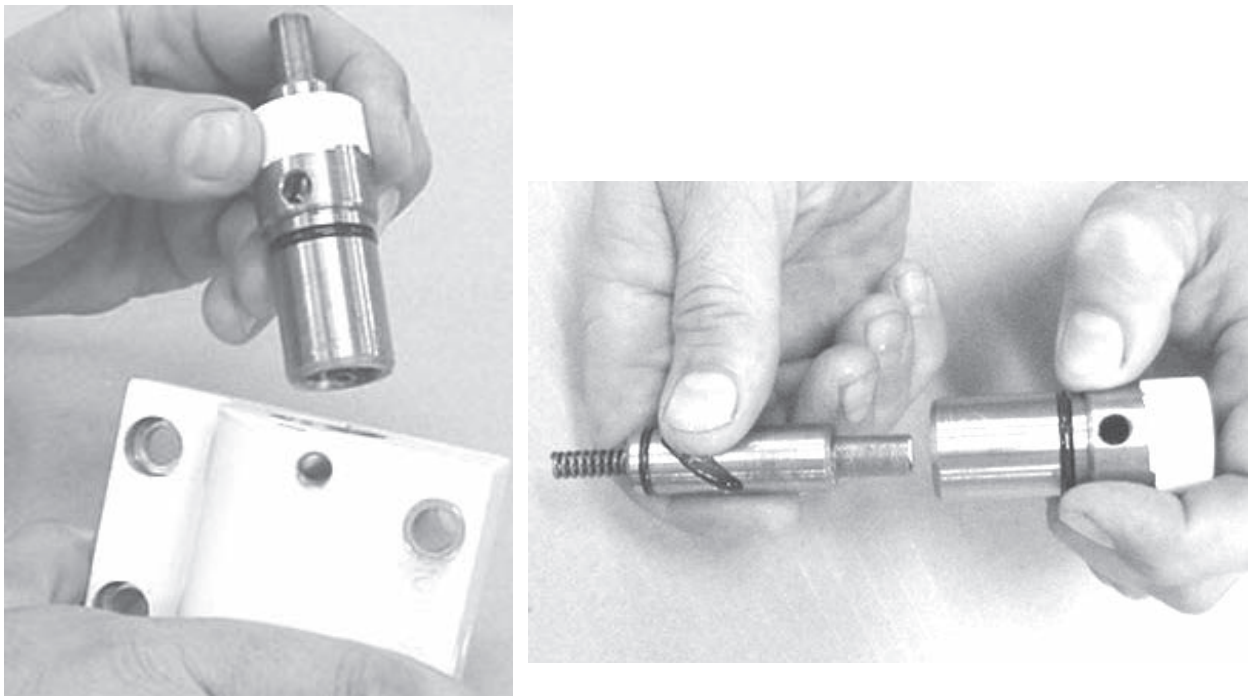


Figure 90. Removing Stem and Adapter from Valve Body (left) and Removing Stem from Adapter (right)

9. Remove the O-ring from the groove in the end of the stem.

Figure 91. Removing O-ring from Stem

10. Remove the inner spring and roll pin from the stem only if part replacement is necessary.

11. Remove the washer from the bore of the valve body (some models).

    Note: The washer may have been removed with the stem.

12. Remove the (outer) spring and piston from the bore of the valve body.

    Note: There may be washer(s) in the bore of the piston (some models).

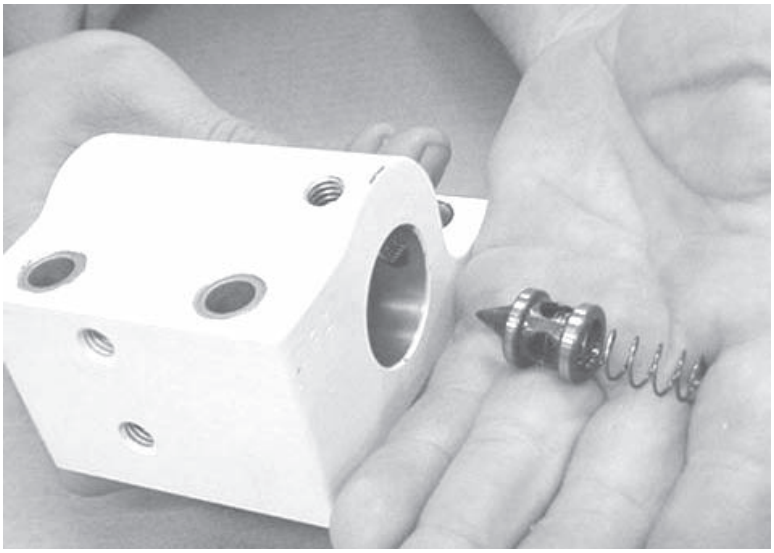


Figure 92. Removing Spring and Piston from Valve Body

13. Remove the O-ring from the groove and the oil seal from the end of the adapter.

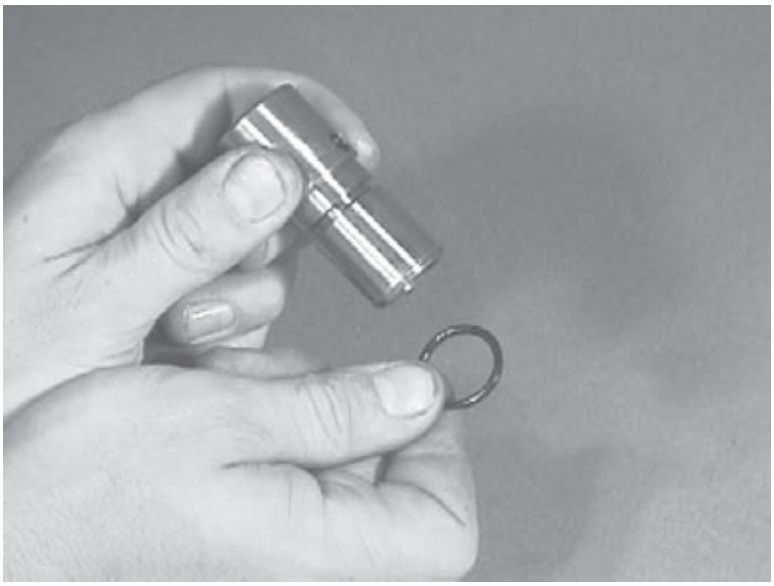


Figure 93. Removing O-ring from Adapter

NOTES

Cleaning and Inspection

Cleaning

Note: Replace all oil seals, gaskets, O-rings, piston rings, seal rings and snap rings as a part of any maintenance or overhaul procedure. Replace shims that are damaged or destroyed in disassembly.

- ❑ Clean all parts using EPA/OSHA approved solvents or by steam cleaning. Parts must be dried and oiled immediately to prevent corrosion.
- ❑ Examine all parts carefully for grit, dirt and abrasives and reclean them if necessary.
- ❑ Clean all oil passages by working a piece of wire back and forth through the passages and then flushing them with cleaning solvent.
- ❑ Use clean solvent to flush oil pumps and valves.
- ❑ Flush all hoses, tubing and coolers, particularly if the unit is being disassembled because of an internal failure.
- ❑ De-burr the housing and bearing carrier with a stone or file in the vicinity of all pusher screw locations.

Cleaning Bearings

DO NOT remove grease in which new bearings are packed. Thoroughly wash bearings that have been in service. Soak bearings in solvent if they are particularly dirty or filled with hardened grease.

⚠ CAUTION

Never dry bearings with compressed air. DO NOT spin unlubricated bearings. Oil bearings with SAE 10 engine oil immediately after cleaning. Oil bearings before inspection.

Preventing Dirt from Entering into Bearings

Dirt and grit in bearings are often responsible for bearing failure; consequently, it is important to keep bearings clean. **DO NOT** remove grease from new bearings. Keep the wrapper on new bearings until they are installed. **DO NOT** expose clean bearings if they are not to be assembled at once. Wrap them with a clean lint-free cloth or paper to keep out dust.

Previously Sealed Joints

- ❑ For previously sealed joints, scrape surfaces to remove old gasket material or silicone.
- ❑ Clean surfaces with solvent to remove oil and grease residue.
- ❑ Test for clean surfaces by applying a few drops of cool water to the surfaces. Parts are sufficiently clean if water covers the surface in a film. If the water puddles or forms beads, use fresh solvent and reclean.

Inspection

Housings, Cast Parts, and Machined Surfaces

- ❑ Replace cast parts or housings that are cracked.
- ❑ Inspect bores for wear, grooves, scratches and dirt. Remove burrs and scratches with crocus cloth or soft stone. Replace deeply grooved or scratched parts. **DO NOT** remove excess material by sanding. This will cause loss of press of bearings or races.
- ❑ Inspect oil passages for obstructions. If you find an obstruction, remove it with compressed air or work a wire back and forth through the passage and flush it with solvent.
- ❑ Inspect machined surfaces for burrs, scratches, nicks and foreign matter. If you cannot remove the defect with crocus cloth or a soft stone, replace the part.
- ❑ Inspect ground tapers for burrs or nicks. If you cannot remove the defect with a soft stone, replace the part.
- ❑ Inspect ground tapers for scratches, galling or scoring damage. If you find any of these defects, replace the part.
- ❑ Inspect threaded openings for damaged threads. Chase damaged threads with a tap of the correct size.
- ❑ Inspect studs for damaged threads and looseness. Replace defective studs.
- ❑ Inspect dowel pins for wear or damage. Replace defective dowels. This applies where a matched set of parts is not involved.
- ❑ Inspect dowel pin holes for wear due to movement between mating parts. If a dowel pin hole is worn, re-bore and sleeve the hole when possible. Otherwise, replace the parts. This applies where a matched set of parts is not involved.

Valve Seats

Inspect valve seats for burrs, nicks and scratches. If you cannot remove these defects with a crocus cloth, replace the part. Check to see that the valve is seating properly after reworking the valve seat.

Bearings

- ❑ Inspect bearings for rotation roughness. Replace the bearing if the rotation is rough.
- ❑ Inspect bearings for corrosion, and for wear indication on balls or rollers. Inspect for scored, scratched, cracked, pitted or chipped races. If you find one of these defects, replace the bearing.
- ❑ Inspect bearing bores and shafts for grooved, burred, or galled conditions that would indicate the bearing has been turning in its housing or on its shaft. If you cannot repair the damage with a crocus cloth, replace the part.

Bushings and Sleeves

Inspect bushings for size and out-of-roundness. Inspect for scores, burrs, sharp edges, and evidence of overheating. Remove scores with a crocus cloth. If the bushing is out-of-round, deeply scored, or excessively worn, replace it.

Thrust Washers and Spacers

Inspect thrust washers for distortion, scores, burrs and wear. Rework or replace any defective thrust washers or spacers.

Gears

- ❑ Inspect gears for scuffed, nicked, burred or broken teeth. If you cannot remove the defect with a soft stone, replace the gear.
- ❑ Inspect gear teeth for wear that may have destroyed the original tooth shape. If you find this condition, replace the gear.
- ❑ Inspect thrust faces of gears for scores, scratches and burrs. If you cannot remove these defects with a soft stone, replace the gear.

Splined Parts

Inspect splined parts for stripped, twisted, chipped or burred splines. Remove burrs with a soft stone. Replace the part if other defects are found.

Springs

Inspect springs for broken or distorted coils. Replace the spring if either of these defects is found.

Flexible Hoses

Inspect all flexible hoses for cracks and sponginess. Replace damaged hoses.

Clutch Plates

Inspect clutch plates for signs of overheating, pitting, or excessive wear of the friction and splined surfaces. Replace the clutch plates if one of these defects is found. Refer to wear limits in Description and Specifications.

NOTES

Assembly

General

During service of this unit, all O-rings, gaskets and seals **must be** replaced.

Refer to cleaning and inspection information in this manual prior to assembly. It is good practice to compare the new parts with those being replaced during the assembly process (to make sure you don't mistake the quantity or size).

Flat washers are used under all fasteners where the head of the fastener contacts an aluminum surface.

Unless otherwise specified, all torque values listed are for capscrews that have been lubricated on the threads and contact surfaces.

Pipe threads called out as PT on drawings and in this text are different from NPT threads. PT threads and NPT threads are NOT interchangeable. Adapters are available from several manufacturers to convert PT threads to NPT threads.

Where grease is specified, use a lithium based grease (NLGI 2).

Submerge all new clutch friction plates in clean transmission oil for a minimum of one hour prior to installation.

This transmission uses liquid sealer in many locations. The approved sealant is Loctite® 518 (MA1015), applied per S774 (a thin layer of sealant is all that is required), with Locktite® Primer N (MA1012). Avoid getting sealant into the O-ring counter bores.

This transmission uses thread lockers MA908 and MA1007 at specified capscrew locations.

Note: In the discussion that follows, the input side of the transmission is the front and the output side is the rear. Left and right sides are determined by facing from the rear toward the front.

⚠ CAUTION

Appropriate eye protection must be worn during transmission assembly. To avoid personal injury, proper safety equipment must be used during installation of any heated bushings, bearings and other components.

Primary Clutch Shaft Assembly

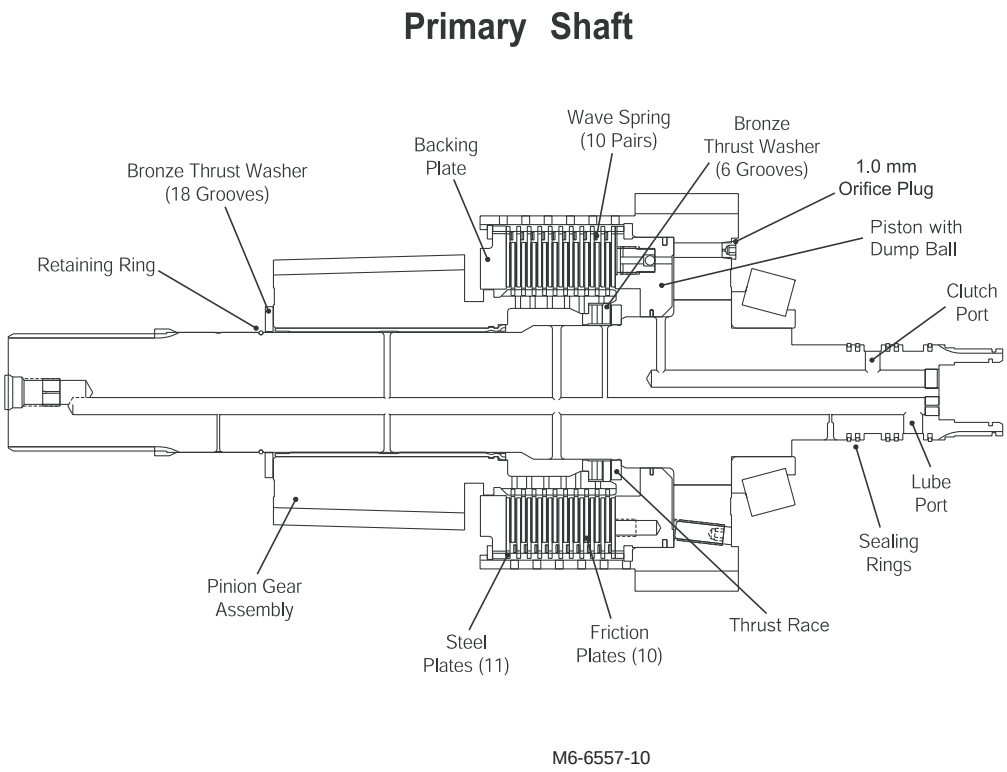
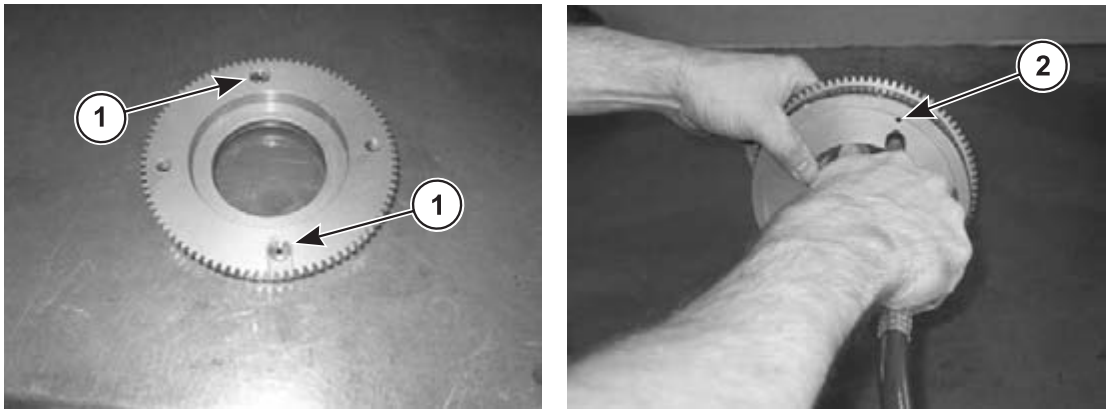


Figure 94. Primary Clutch Shaft Component Identification and Location

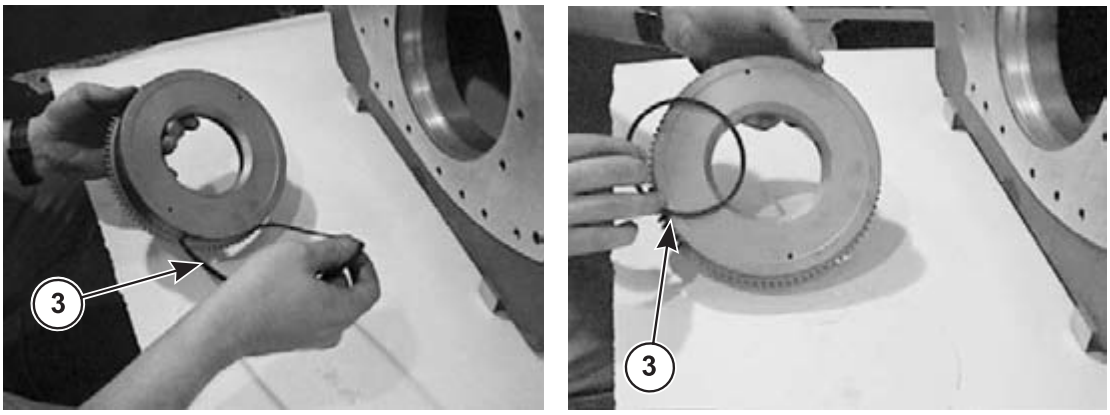
1. Inspect the clutch piston dump valves (1) for proper operation. Be sure the dump valve balls are free to move. The clutch piston dump valves are not serviced separately.



AR6557-1023 AR6557-1021

Figure 95. Clutch Piston with Dump Balls (1)

2. Replace the clutch piston seals (3). Lubricate the clutch piston sealing rings before installing the piston into the clutch housing.



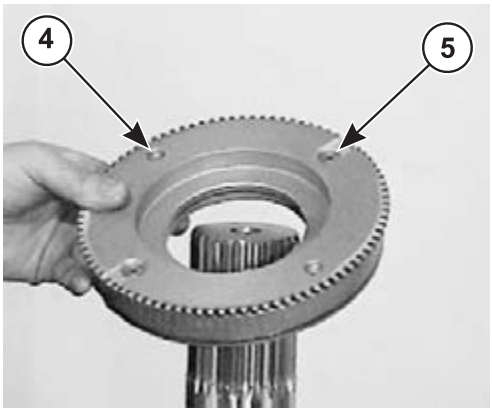
AAR200A-6557 AAR200B-6557

Figure 96. Installing Cutch Piston Seals (3)

3. Lubricate the clutch piston bore with a thin film of grease. Install the piston into the clutch housing. Gently push the piston by hand until it is fully engaged into the clutch (6).

Note: The piston contains two (M12-1.75) threaded holes (4) into which screws can be inserted to aid in assembly. The piston is also equipped with two dump valves (5).

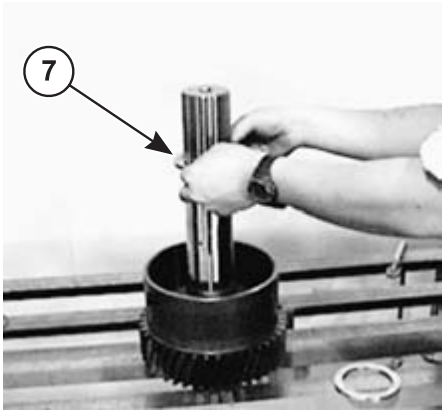
Note: If the piston is difficult to install by hand, remove the piston assembly and inspect the piston seals.

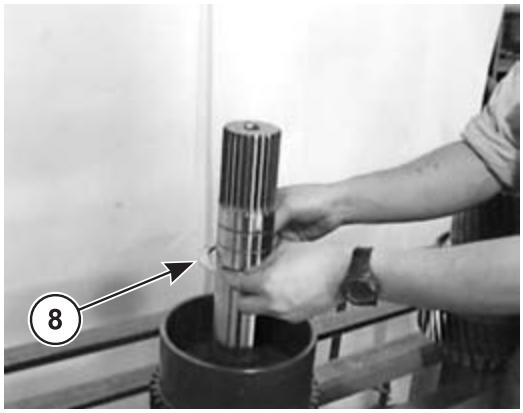


AAR188E-6557 AARR191-6557

Figure 97. Clutch Piston Installation

4. Insert the steel thrust race (7) onto the shaft. Ensure the steel thrust race is seated against the shaft shoulder. Install the inner bronze (8) thrust washer (with 6 radial grooves) onto the shaft.



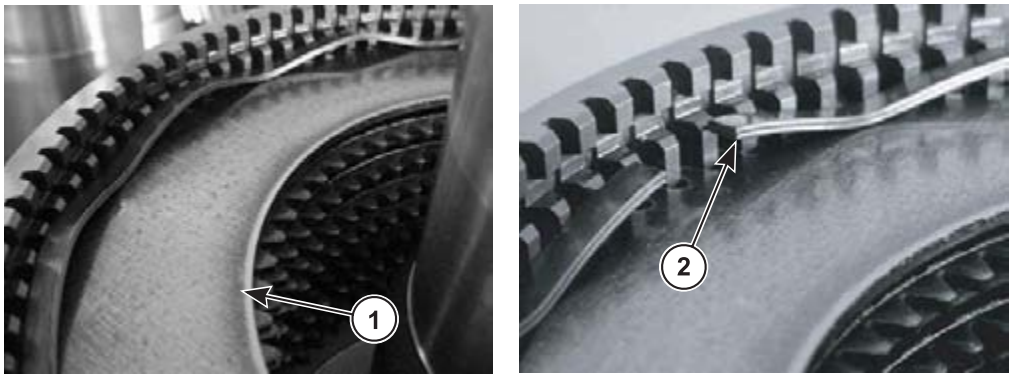


AAR200F-6557 AAR200E-6557

Figure 98. Installing Steel Thrust Race (7) and Bronze Thrust Washer (8)

5. Install the clutch plates.
   a. Install a steel (1) clutch plate next to the piston.
   b. Install a friction plate. Place two (a pair) wave springs (2) around the outer circumference of each friction plate. Each pair of wave springs is installed with the ends aligned. The wave spring pairs are installed with their ends oriented in a random manner.

Note: Some early units only have one wave spring per clutch plate.



RMVC026FGS RMVC028FGS

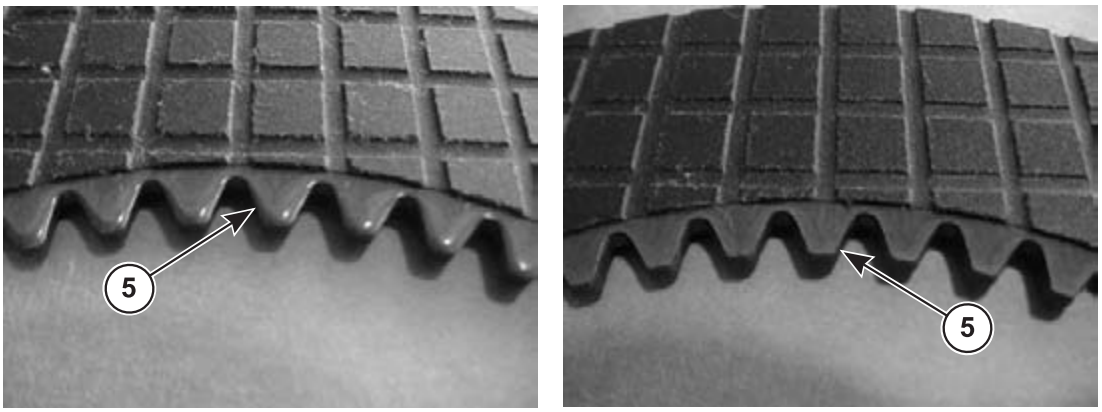
Figure 99. Clutch Plate (1) and Wave Spring (2) Installation

   c. Install the remaining clutch plates and wave springs in an alternating fashion until all clutch plates have been installed (11 steel plates, 10 friction plates, 10 pairs of wave springs).

Note: A steel plate is located next to the piston and the clutch backing plate.

Installation Note:

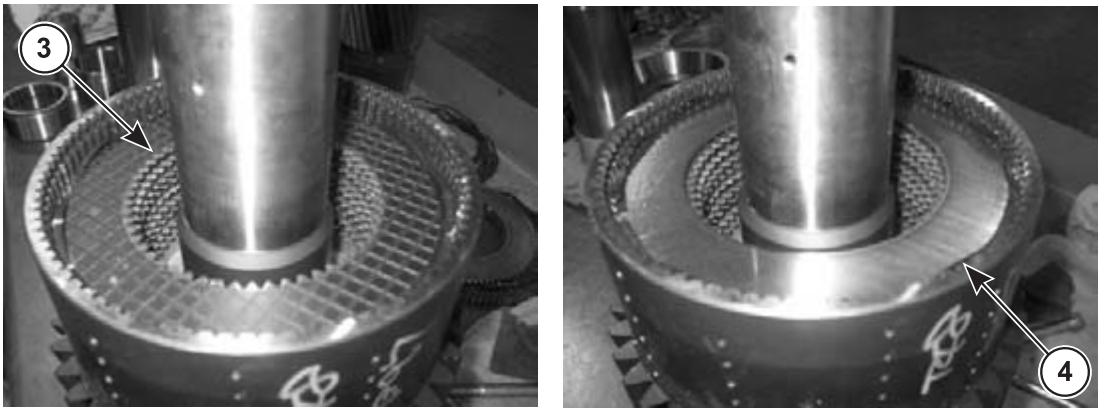
Friction Plates: When installing clutch friction plates, install the plate with the rounded edge (5) away from the piston. The rounded edge makes installation of the pinion gear splines easier to align as the pinion gear is installed into the transfer gear.



AARMVC-029F AARMVC-001F

Figure 100. Clutch Friction Plate Edge (5), Rounded Edge and Sharp Edge Shown

Steel Plates: When installing steel clutch plates (4), install the plate with the rounded edge toward the piston. The rounded edge is easier to install into the transfer gear splines when installed in this manner.

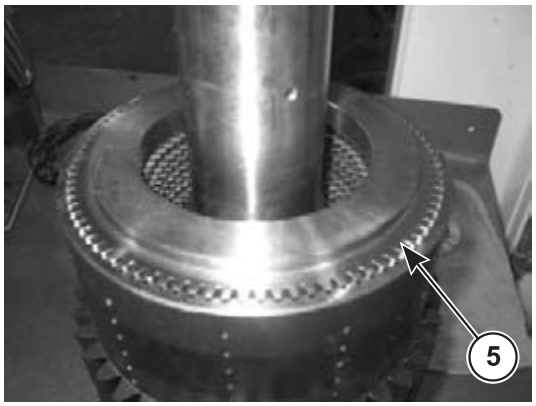


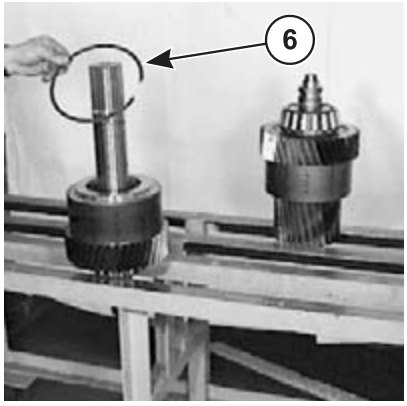
AAR6557-067 AAR6557-068

Figure 101. Clutch Friction Plate (4) and Steel Plate (4) Installation

6. Install the clutch backing plate (5). Press the backing plate firmly into the clutch housing to ensure the splines of the clutch are aligned.

7. Place the internal snap (6) ring next to the clutch backing plate.



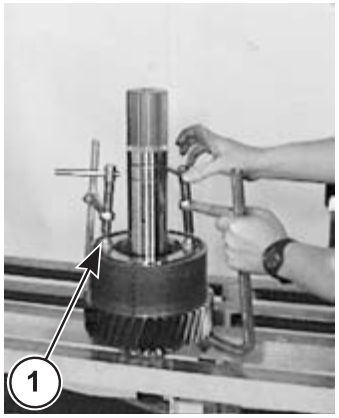


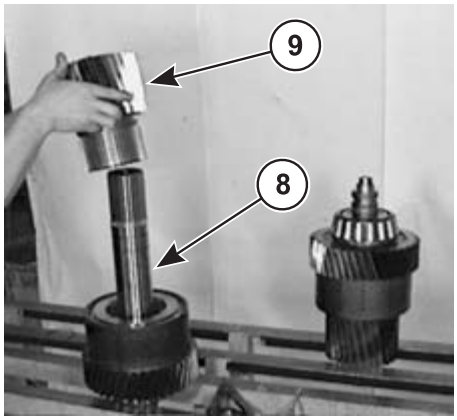
AAR6557-069 AAR187-6557

Figure 102. Clutch Backing Plate (5) and Internal Snap Ring (6)

8. Install two clamps (1) on the clutch housing and backing plate. Use the clamps to evenly compress the clutch until the internal snap ring can be installed properly into the clutch housing. Install the snap ring. Remove the clamps.

9. Lubricate the area of the clutch shaft (8) that will contact the pinion bushing. Install the pinion assembly (9). Gently rotate the pinion as the pinion is lowered into the clutch plates until the splines are fully engaged in all of the clutch plates.



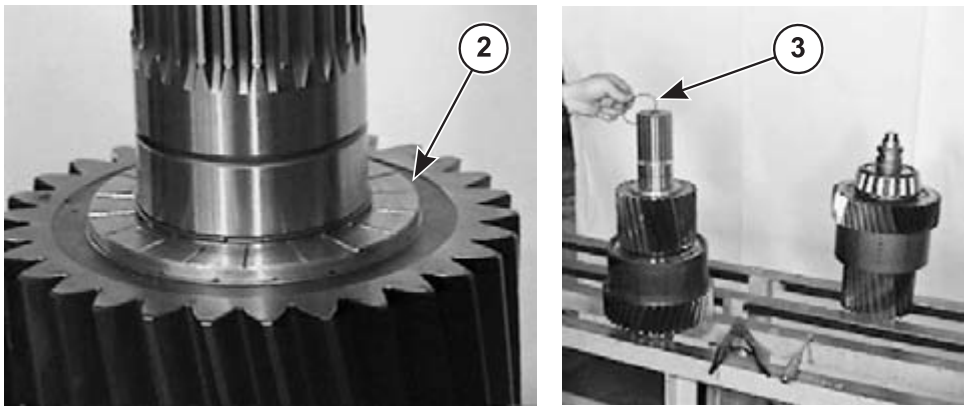


AAR186-6557 AAR183-6557

Figure 103. Clutch Backing Plate (1) and Pinion Assembly (9)

10. Install the bronze (2) thrust washer (with 18 radial grooves) next to the pinion.
    Note: If the pinion is fully engaged with all of the clutch plates, the round snap ring groove will be visible above the bronze thrust washer.

11. Install the round snap ring (3) onto the shaft to retain the bronze thrust washer.



AAR200N-6557 AAR182-6557

Figure 104. Bronze Thrust Washer (2) and Round Snap Ring (3) Installation

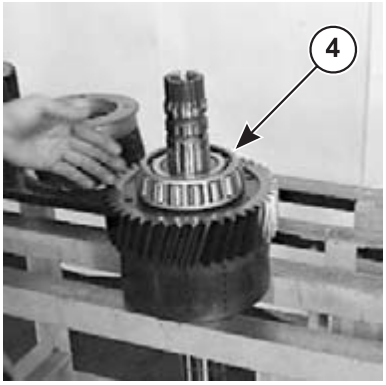
12. Verify the pinion has measurable end float.

13. Invert the shaft assembly positioning the sealing ring end of the shaft up. Install the rear tapered roller bearing (if removed). Heat the clutch shaft rear bearing cone (4) to a temperature of 120°C (250°F). Place the bearing on the clutch shaft and push it firmly into position against the clutch housing.

Note: Be sure to seat the bearing against the clutch housing as the bearing cools.

⚠ WARNING

Handle the bearing with care. The bearing is HOT.



AAR193A-6557

Figure 105. Rear Bearing Cone (4) Installation

Secondary Clutch Shaft Assembly

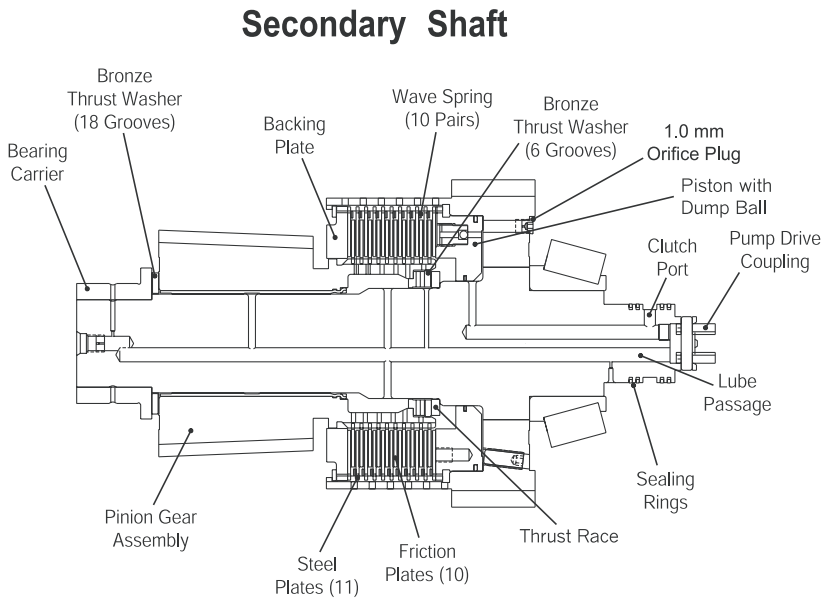
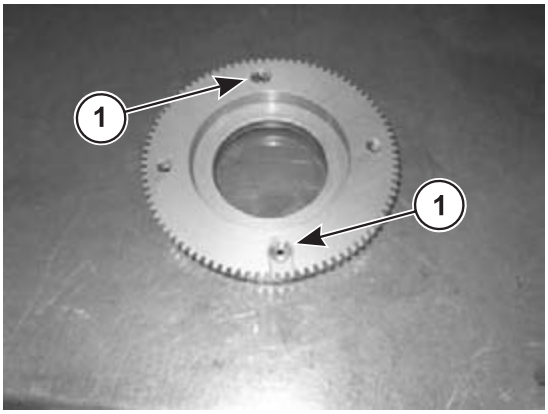
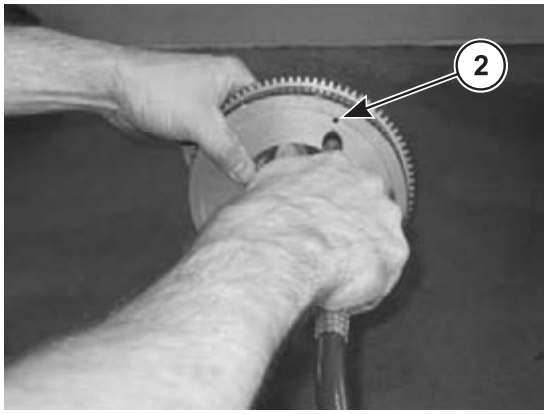


Figure 106. Secondary Clutch Shaft Component Identification and Location

1. Inspect the clutch piston dump valves (1) for proper operation. Be sure the dump valve balls are free to move. The clutch piston dump valves are not serviced separately.

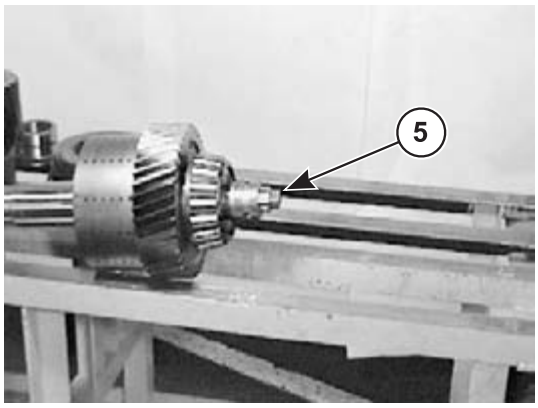


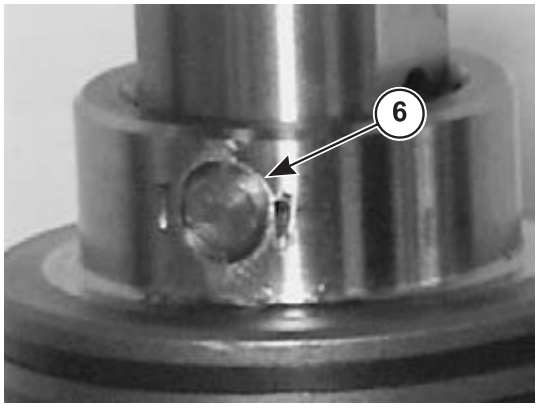


AR6557-1023 AR6557-1021

Figure 107. Clutch Piston with Dump Balls (1)

2. Install the pump drive coupling (5) into the rear end of the shaft if removed. Place the coupling in the end of the shaft and press the retaining pin through the components. When the retaining pin is flush (6) with the shaft, stake it in two locations at both ends of the pin.

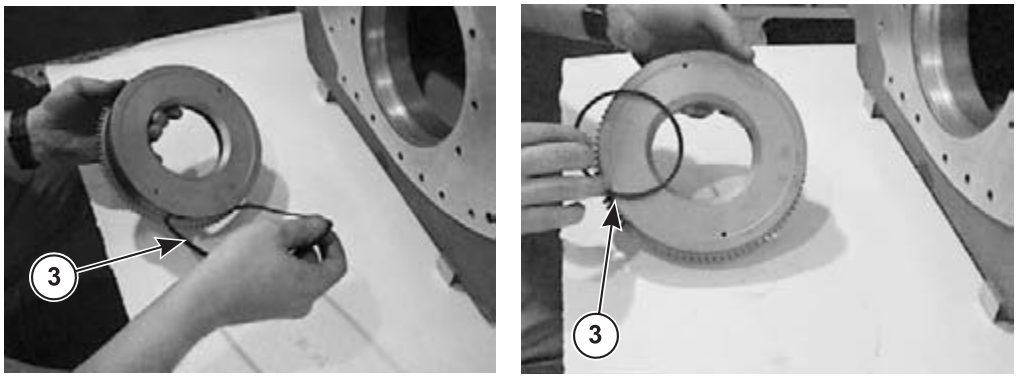




AAR197A-6557 AAR170-6557

Figure 108. Pump Drive Coupling (5 and 6) Installation

3. Replace the clutch piston seals (3). Lubricate the clutch piston sealing rings before installing the piston into the clutch housing.



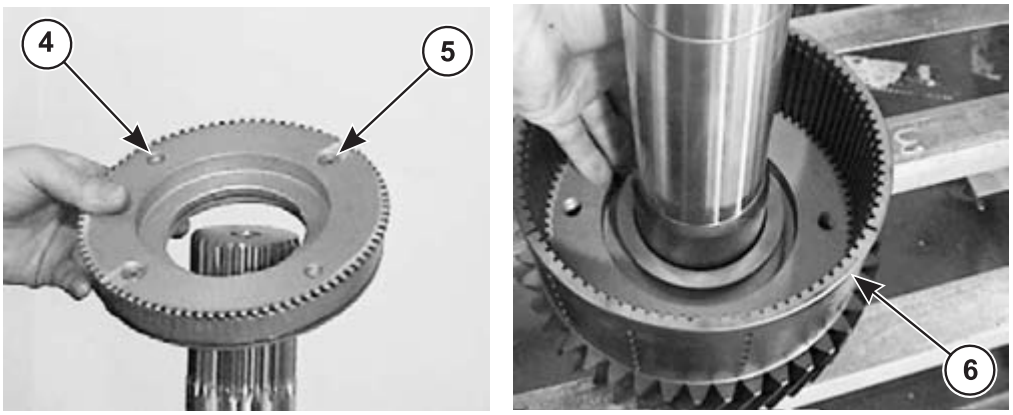
AAR200A-6557 AAR200B-6557

Figure 109. Installing Cutch Piston Seals (3)

4. Lubricate the clutch piston bore with a thin film of grease. Install the piston into the clutch housing. The piston contains two threaded holes (M12-1.75) in which screws can be inserted to aid in assembly. Gently push the piston by hand until it is fully engaged into the clutch (6).

Note: The piston contains two (M12-1.75) threaded holes (4) into which screws can be inserted to aid in assembly. The piston is also equipped with two dump valves (5).

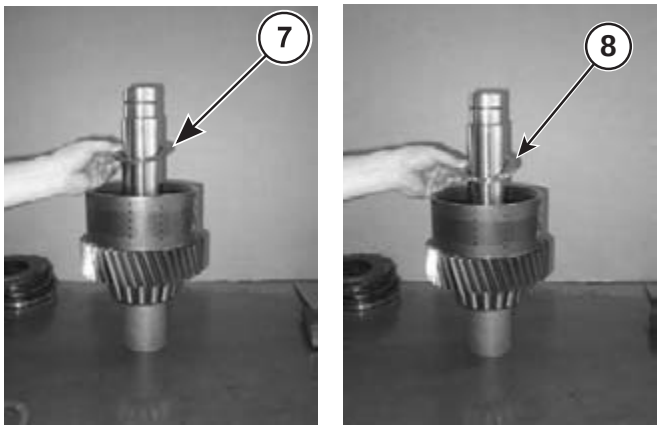
Note: If the piston is difficult to install by hand, remove the piston assembly and inspect the piston seals.



AAR188E-6557 AAR191-6557

Figure 110. Clutch Piston Installation

5. Insert the steel thrust race (7) onto the shaft. Ensure the steel thrust race is against the shaft shoulder. Install the inner bronze (8) thrust washer (with 6 radial grooves) onto the shaft.

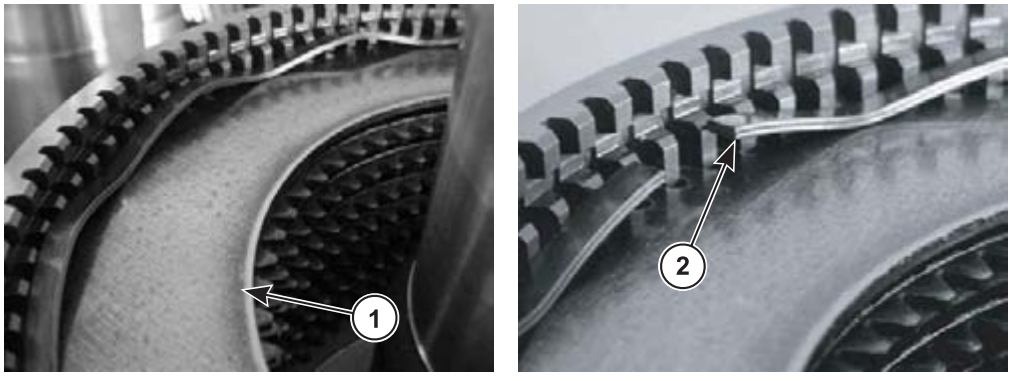


AARR6557-1015BE AARR6557-1016BE

Figure 111. Installing Steel Thrust Race (7) and Bronze Thrust Washer (8)

6. Install the clutch plates.
   a. Install a steel (1) clutch plate next to the piston.
   b. Install a friction plate. Place two (a pair) wave springs (2) around the outer circumference of each friction plate. Each pair of wave springs is installed with the ends aligned. The wave spring pairs are installed with their ends oriented in a random manner.

   Note: Some early units only have one wave spring per clutch plate.



RMVC026FGS RMVC028FGS

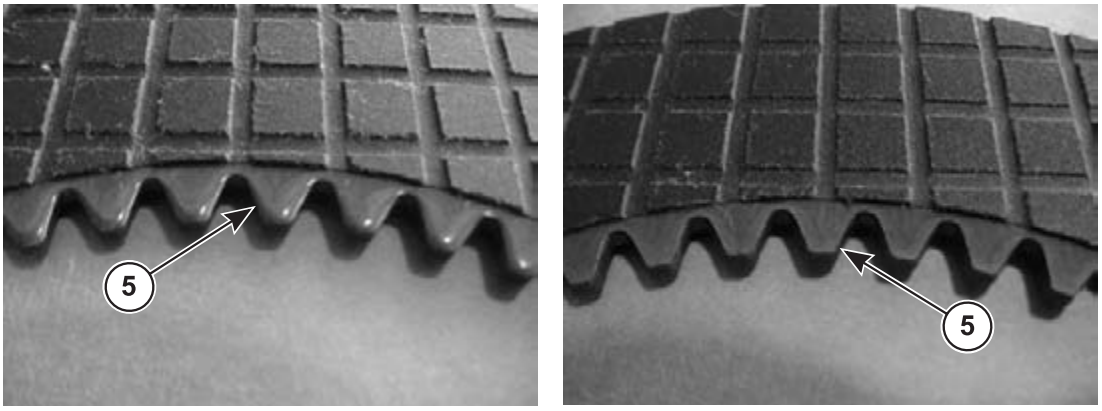
Figure 112. Clutch Plate (1) and Wave Spring (2) Installation

c. Install the remaining clutch plates and wave springs in an alternating fashion until all clutch plates have been installed (11 steel plates, 10 friction plates, 10 pairs of wave springs).

Note: A steel plate is located next to the piston and the clutch backing plate.

Installation Note:

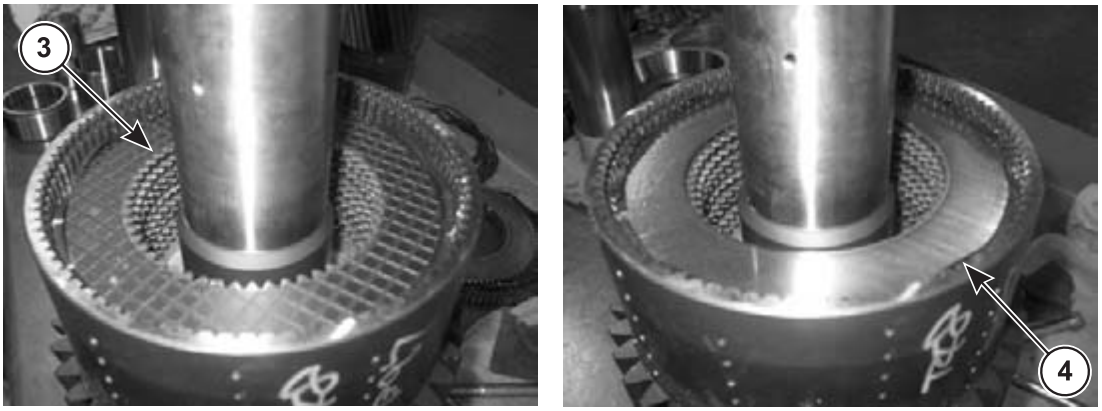
Friction Plates: When installing clutch friction plates, install the plate with the rounded edge (5) away from the piston. The rounded edge makes installation of the pinion gear splines easier to align as the pinion gear is installed into the transfer gear.



AARMVC-029F AARMVC-001F

Figure 113. Clutch Friction Plate Edge (5), Rounded Edge and Sharp Edge Shown

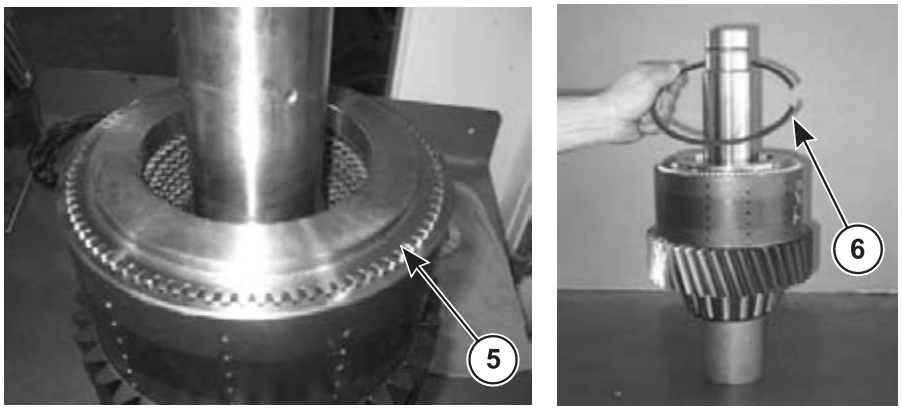
Steel Plates: When installing steel clutch plates (4), install the plate with the rounded edge toward the piston. The rounded edge is easier to install into the transfer gear splines when installed in this manner.



AAR6557-067 AAR6557-068

Figure 114. Clutch Friction Plate (4) and Steel Plate (4) Installation

7. Install the clutch backing plate (5). Press the backing plate firmly into the clutch housing to ensure the splines of the clutch are aligned.
8. Place the internal snap (6) ring next to the clutch backing plate.

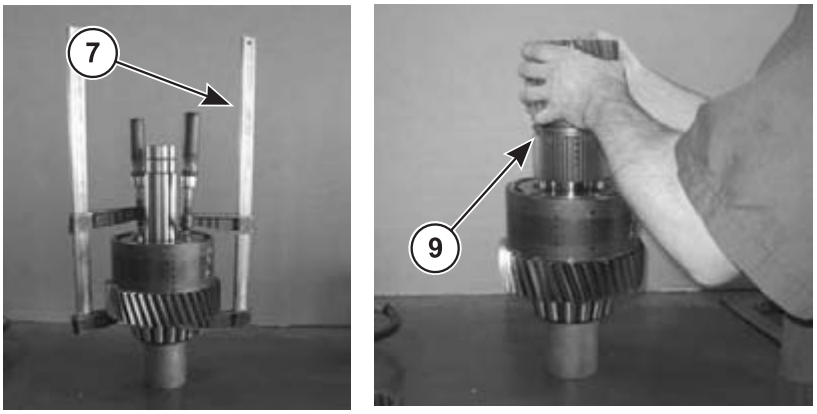


AAR6557-069 ARR6557-1012

Figure 115. Clutch Backing Plate (5) and Internal Snap Ring (6)

9. Install two clamps (7) on the clutch housing and backing plate. Use the clamps to evenly compress the clutch until the internal snap ring can be installed properly into the clutch housing. Install the snap ring. Remove the clamps.

10. Lubricate the area of the clutch shaft (8) that will contact the pinion bushing. Install the pinion assembly (9). Gently rotate the pinion as the pinion is lowered into the clutch plates until the splines are fully engaged in all of the clutch plates.



AAR6557-1010BE AR6557-1008BE

Figure 116. Clutch Backing Plate and Pinion Assembly (9)

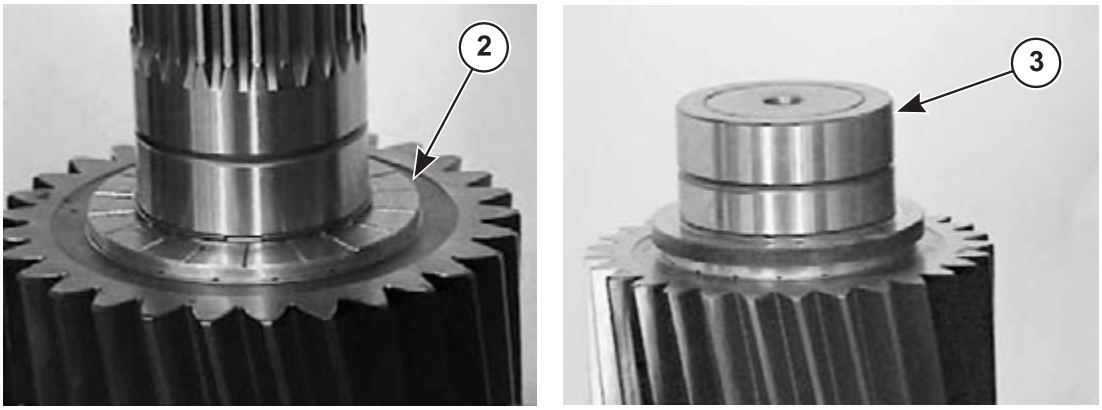
11. Install the bronze (2) thrust washer (with 18 radial grooves) next to the pinion.

12. Heat the secondary clutch shaft front bearing carrier (3) to a temperature of 120°C (250°F). Install the bearing carrier on the clutch shaft and push it firmly into position against the shaft shoulder as it cools.

⚠ WARNING

Handle the bearing carrier with care. The bearing carrier is HOT.

Note: The bearing carrier (3) should contact the shaft (stop shoulder) as it is installed. To verify the bearing carrier is positioned correctly, the end of the bearing carrier should be flush with the end of the shaft. Place a straight edge across the top of the shaft and bearing carrier. If all components are installed correctly, no air gap should be observed between the straight edge and the end of the shaft.



AAR200N-6557 AAR200L-6557

Figure 117. Bronze Thrust Washer (2) Rear Bearing Carrier (3) Installation

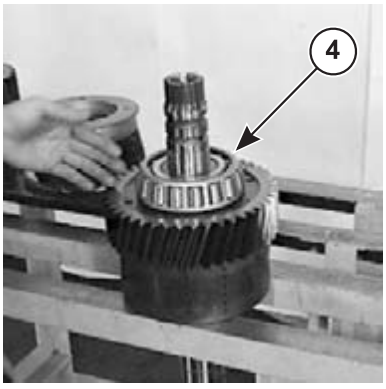
13. Verify the pinion has measurable end float.

14. Invert the shaft assembly positioning the sealing ring end of the shaft up. Install the rear tapered roller bearing (if removed). Heat the clutch shaft rear bearing cone (4) to a temperature of 120°C (250°F). Place the bearing on the clutch shaft and push it firmly into position against the clutch housing.

    Note: Be sure to seat the bearing against the clutch housing as the bearing cools.

⚠ WARNING

Handle the bearing with care. The bearing is HOT.



AAR193A-6557

Figure 118. Rear Bearing Cone (4) Installation

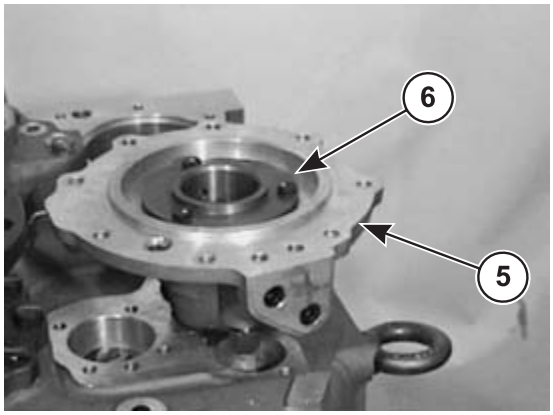
Primary and Secondary Shaft Seal Ring Insert Installation

1. Heat the aluminum cover (5) to 120°C (250°F). Cool the cast iron insert (6) to -20°C (-5°F).

⚠ WARNING

Handle the components (heated and cooled) with care. The cast iron insert will be located with three capscrews. Use three guide studs to index the insert in the cover correctly.

2. Install the new insert into the aluminum cover. Remove the guide studs, and install the three screws and torque them to 23 N•m (17 lb•ft).



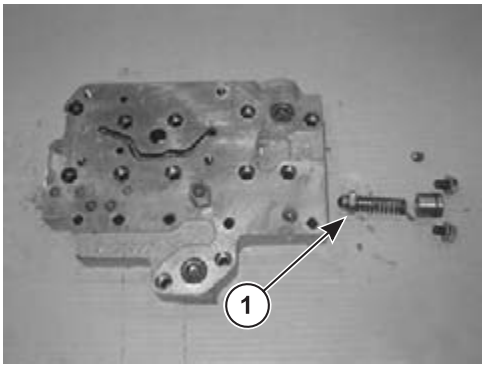
AAR283-6557

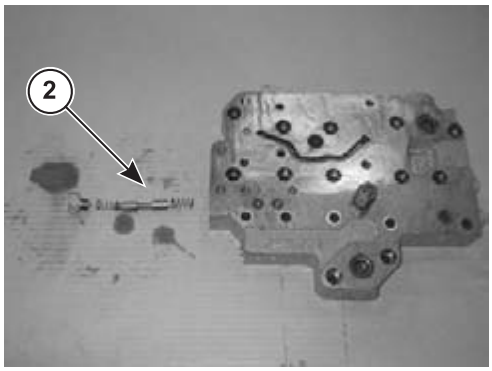
Figure 119. Shaft Seal Ring Insert (6)

Ditch Plate Assembly

1. Install the lubrication oil pressure relief valve (1). Install the steel ball, the retainer, and spring into the bore of the ditch plate. Install the sealing plug and capscrew retainers. Torque the capscrews to 22 N•m (16 lb•ft).

2. Install the lubrication oil priority valve (2). Install the spring, valve spool, the remaining spring, and the plug into the bore of the ditch plate. These two springs are identical.





R6557-017BE R6557-016BE

Figure 120. Ditch Plate, Pressure Relief Valve (1), and Lube Priority Valve (2)

Trailing Pump Driven Gear Installation

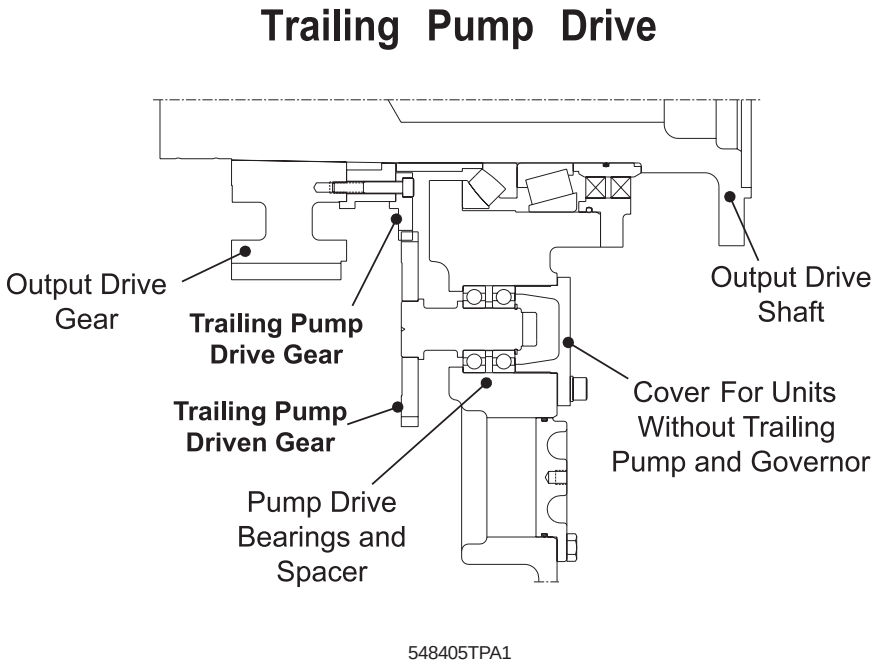


Figure 121. Trailing Pump Drive Component Identification and Location

Note: The housing should be placed with the front face down.

1. Lubricate the bore (1) of the transmission housing. Install the trailing pump drive shaft (2) through the bearing bore in the transmission housing.

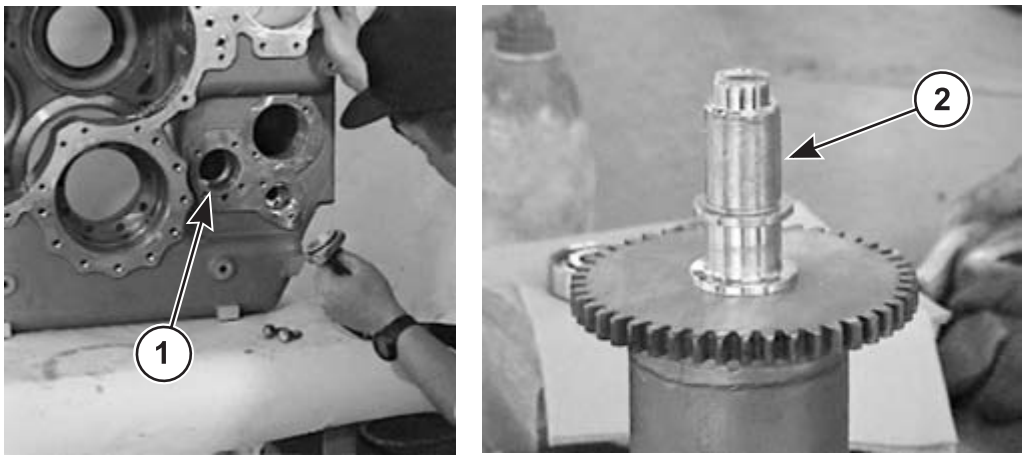
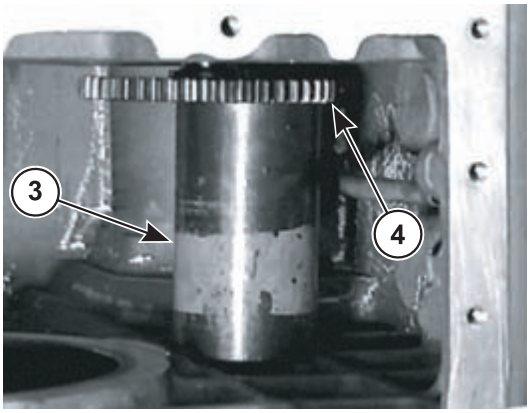
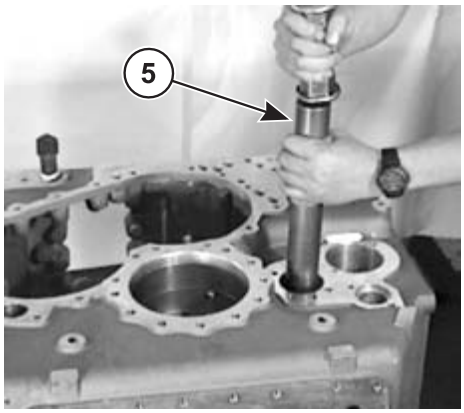


Figure 122. Trailing Pump Driven Shaft (2)

2. Position special tool T-2182-44 (3) below the shaft assembly (inside the transmission housing) to support the gear/shaft (4) in the correct position during the bearing installation process. Use special tool T-21482-45 (5) to press the first bearing onto the trailing pump drive shaft. Press on the I.D. of the bearing when installing.



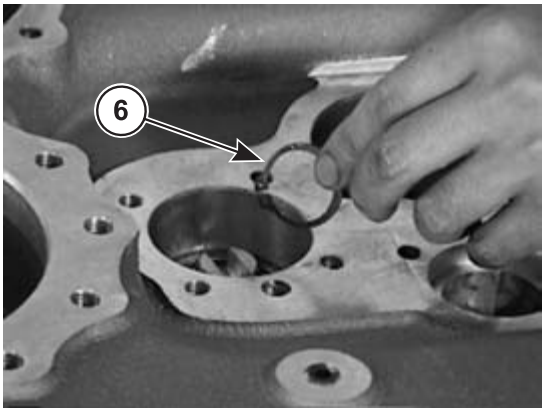


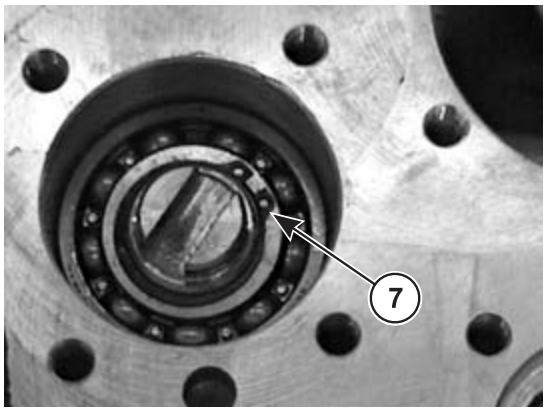
AAR204C1-6557 AAR204B-6557

Figure 123. Trailing Pump Driven Gear/Shaft (4) and Bearing Installation

3. Install the spacer and the second bearing into the bearing bore. Press the spacer and bearing into position.

4. Install a snap ring (6) to retain the bearing on the pump drive idler shaft. If the snap ring (7) fits securely into position, the bearings and spacer are properly positioned.





AAR206-6557 AAR204E-6557

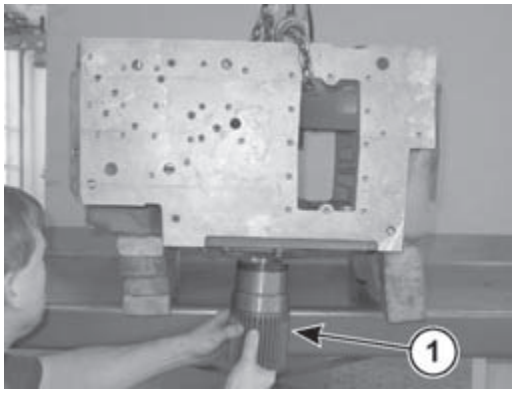
Figure 124. Trailing Pump Driven Shaft Snap Ring (7) Installation

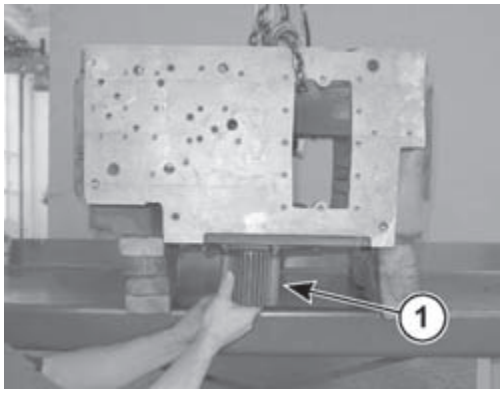
Input Drive Sleeve and Shaft Seal

1. Securely position the transmission on blocks with the input shaft (front end) down, with clearance to allow installation of the input drive sleeve from below.

   a. Apply MA1015 sealer to the outside diameter of the input seal. Install the seal in the main housing. Press the input seal into the housing from the bearing cup side of the carrier until flush with the machined surface (inner surface) of the carrier.
   b. Wrap the snap ring groove of the input drive sleeve (1) with electrical tape to protect the seal surface during installation.
   c. Apply grease to the input seal lip. Apply a grease film to the input drive sleeve seal surface.
   d. Install the input drive sleeve into the housing from below.

   Note: Care must be taken to prevent damage to the input shaft seal. Do not position the input drive sleeve into the seal too far.





AR6557-1068BE AR6557-1069BE

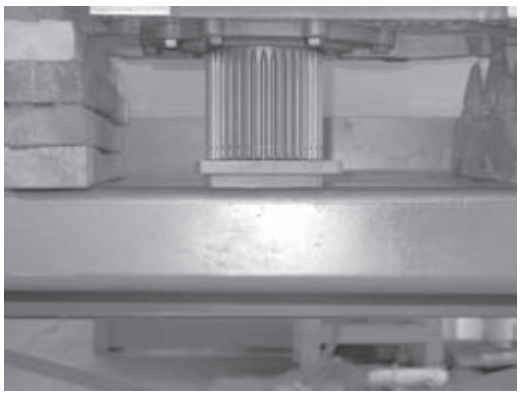
Figure 125. Installing Input Drive Sleeve (1)

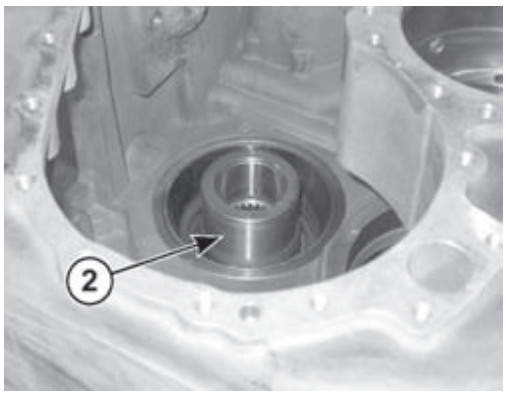
   e. Support the installed input drive sleeve in position while installing bearings.

f. Lubricate the inner bearing surface (2) on the input drive sleeve prior to bearing installation.

⚠ CAUTION

As the input drive sleeve is positioned into the seal retainer take care to prevent damage to the input seal.





AR6557-1070BE AR6557-1071BE

Figure 126. Preparing Input Sleeve for Bearing Installation

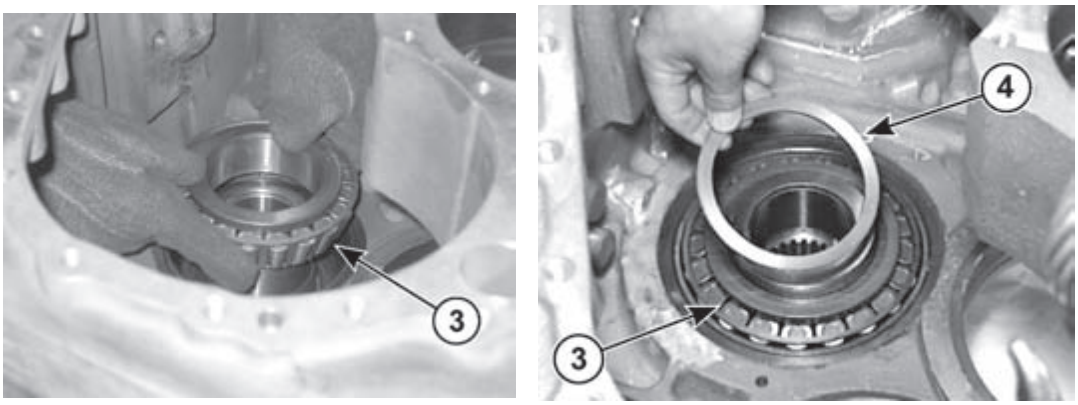
2. Install the primary shaft front bearing.

Note: The following steps must be performed in rapid succession.

a. Heat the input shaft front bearing (3) to a temperature of 120°C (250°F). Place the bearing on the input drive sleeve.

⚠ CAUTION
Use caution when working with heated components.

b. Install the steel spacer (4) on the input drive sleeve.

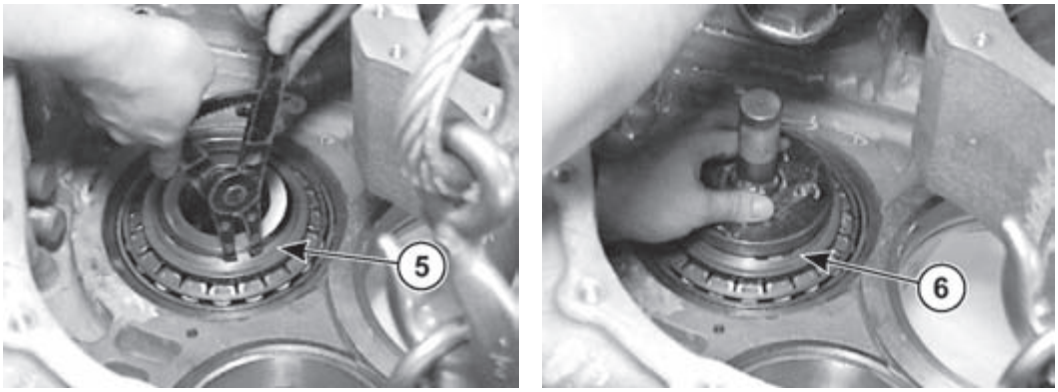


A6557-1073 AAR212C-6557

Figure 127. Input Sleeve Bearing (3) and Spacer (4) Installation

c. Install the snap ring (5) on the input drive sleeve to retain the bearing and snap ring.
d. Remove the spacers from below the input drive sleeve.
e. Press the input drive sleeve into position with the snap ring against the spacer (6) using special tool T-21482-29.

Note: The spacer should be tight against the snap ring and should not rotate.



AAR212E-6557 AAR212D-6557

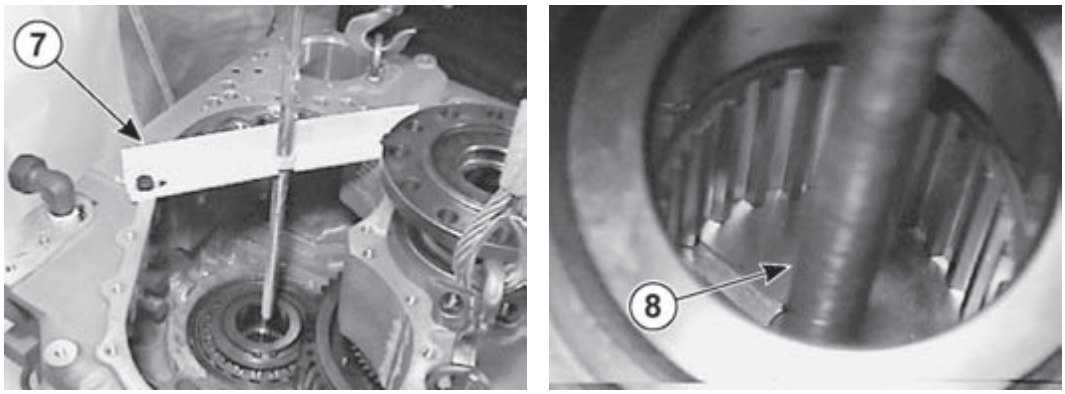
Figure 128. Snap Ring (5) Installation and Positioning Input Drive Sleeve

3. Apply a thin film of grease to the secondary shaft front bearing bore inside of the transmission housing. Press the secondary shaft bearing cup into the transmission housing bore with special tool T-21482-27. The bearing cup should be a light slip fit.

4. Install special tool T-111145 across the primary shaft rear opening (7) in the transmission housing with a threaded rod (8) to maintain the input drive sleeve position during rotation of the transmission housing.

⚠ CAUTION

DO NOT damage the input drive sleeve plug when installing tool T-111145. The primary shaft end is precision ground to contact and ride against the plug.



AAR245-6557 AAR246-6557

Figure 129. Special Tool T-111145 Installation

NOTES

Output Shaft Installation

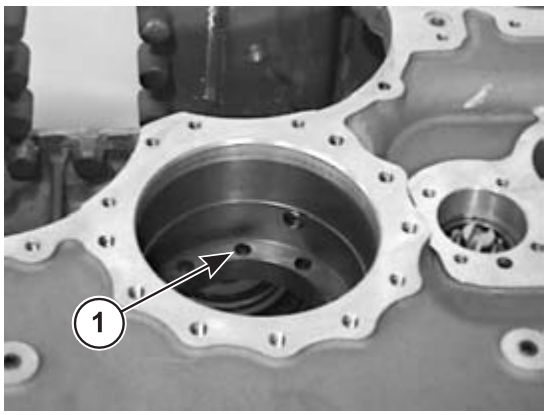
Output Shaft Bearing Adjustment

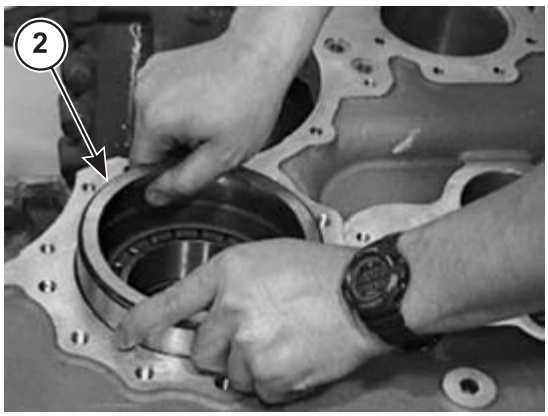
1. If not previously done, position the transmission housing with the output shaft end up.

   Note: Output shaft bearing adjustment is completed without springs installed in the pockets (1) of the transmission housing.

2. Install the rear output shaft spherical roller bearing cup and cone into the transmission housing.

3. Install the rear output shaft tapered roller bearing cone next to the spherical roller bearing. Install the tapered roller bearing cup (2) into the transmission housing. Use special tool T-21482-13 to clamp parts.





AAR221A-6557 AAR242-6557

Figure 130. Output Shaft Bearing Spring Pockets (1) and Bearing (2)

4. Apply a thin film of grease to the secondary shaft front bearing bore inside the transmission housing. Press the secondary shaft bearing cup into the transmission housing bore with T-21482-27. The bearing cup should be a light slip fit.

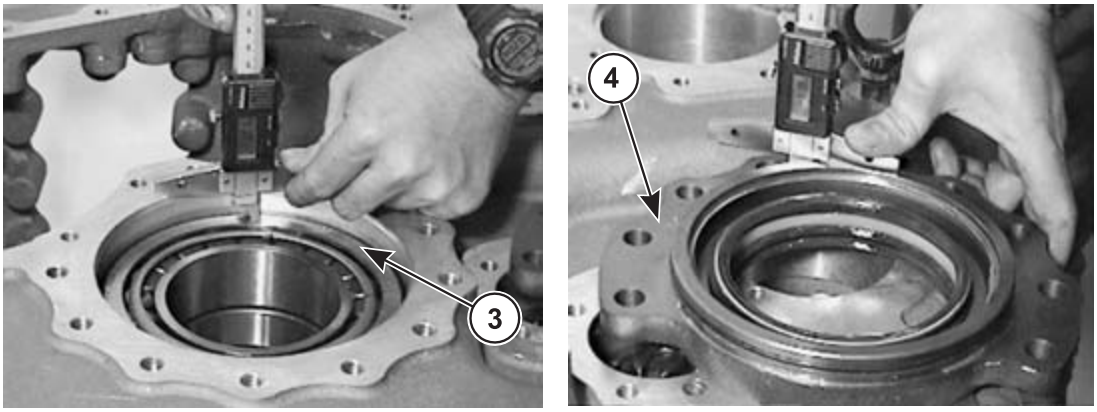
5. Measure the depth of the tapered roller bearing cup into the transmission housing. Measure from the machined surface of the transmission housing to the rear surface of the tapered roller bearing cup (3).

   Measure in three, evenly spaced locations around the circumference of the bearing. If all three readings are identical, record the dimension. If the readings are not identical, adjust the bearings and measure again.

   Bearing Bore Depth = _____

6. Measure the length of the output seal carrier pilot. Record the dimension.

   Output Seal Cover Pilot Dimension = _____



AAR221-6557 AAR222-6557

Figure 131. Measuring Components to Determine Output Shaft Bearing Adjustment

7. Calculate the shim pack required to set the output shaft bearing clearance.
   a. Subtract the output seal carrier dimension from the bearing bore dimension. Bearing Bore Dimension - Seal Carrier Dimension = Output Bearing Clearance.
   b. Calculate the shim pack thickness required to obtain 0.00 - 0.05 mm (0.000 - 0.002 inches) bearing clearance when the shim pack is installed.
   c. Label the shim pack for use when assembling the output shaft subassembly.

8. Remove the output shaft rear bearings from the main transmission housing to allow for assembly of the output shaft.
   a. Place the housing with the input side on top.
   b. Use the output shaft spacer 1-77227 and tool T-21482-38 to press the bearings from the main housing.

Note: The tapered output bearing cup is a slight interference fit in the main housing. Removing the bearing assemblies will require some force.

Output Shaft Rear Bearing Removal

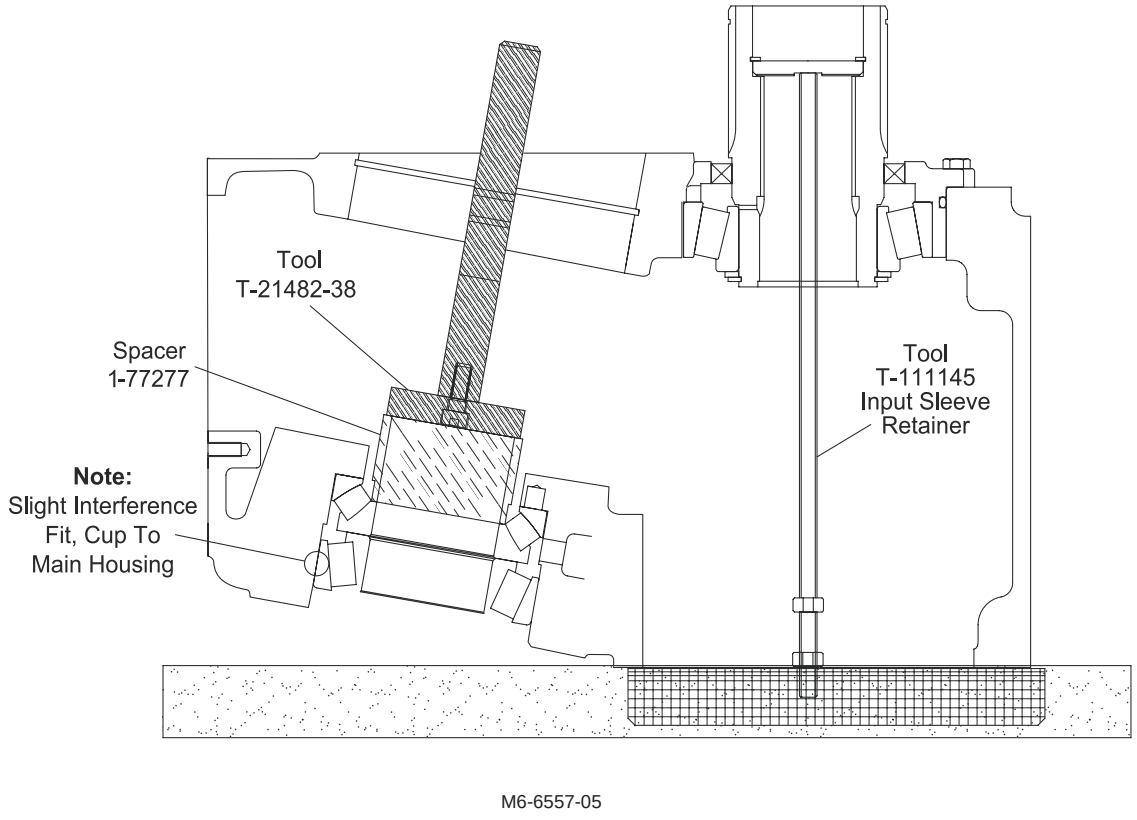


Figure 132. Removing Output Shaft Rear Bearings

Assembling the Output Shaft Subassembly

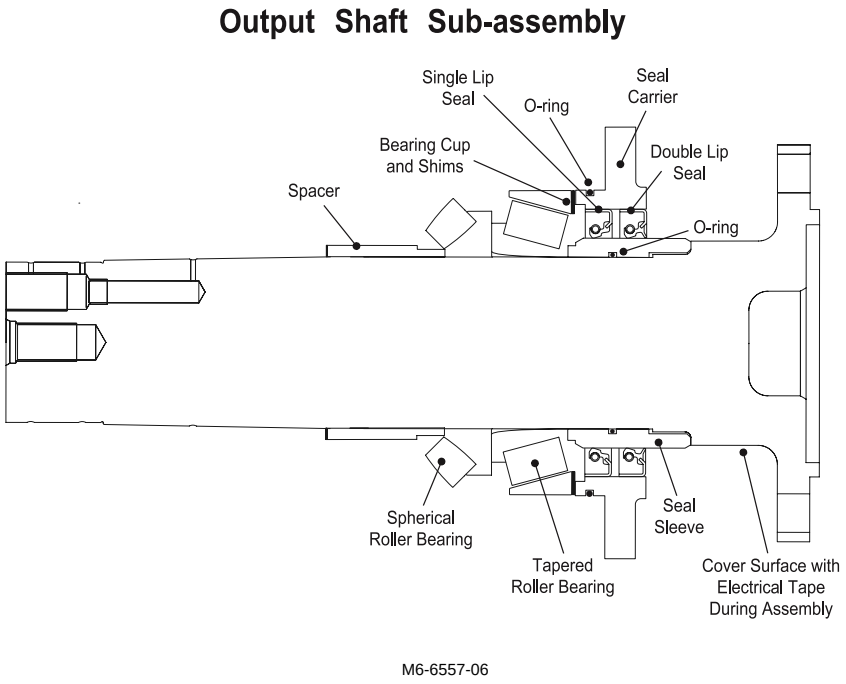


Figure 133. Output Shaft Component Identification and Location

1. Install the oil seal sleeve onto the output shaft.
   a. Install an O-ring (9) into the groove in the inner bore of the oil seal sleeve. Lubricate the surface of the O-ring with grease. Apply a thin film of grease to the output shaft surface (from shaft midpoint to seal sleeve shoulder).

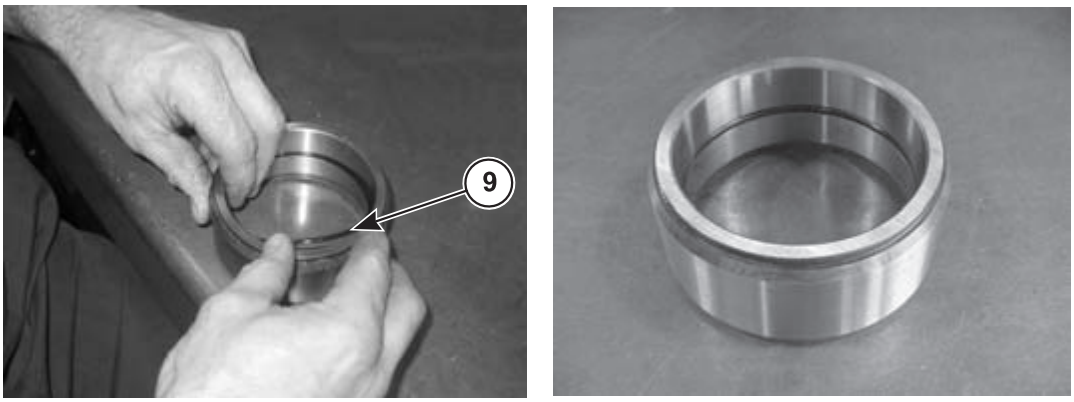
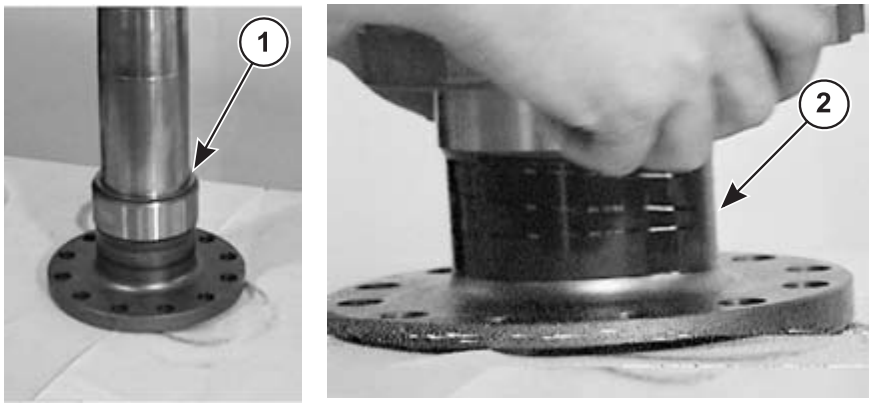


Figure 134. Oil Seal Sleeve O-ring Installation

b. Place the oil seal sleeve (1) onto the output shaft with the counterbored end toward the output flange.

Note: The oil seal sleeve must contact the output shaft shoulder.

c. Wrap the surface of the output shaft with electrical tape (2) to protect the output shaft seal from damage during assembly. Cover the surface of the shaft between the output flange and the oil seal sleeve.



AAR220A1-6557 AAR220R-6557

Figure 135. Oil Sleeve Installation on Output Shaft

3. Install new output shaft seals into the seal carrier using tool T-21578-3.
   a. Apply MA1015 or equivalent sealer to the outside diameter of the oil seals and the bore of the oil seal carrier.
   b. Drive the inner seal (single lip seal) until it is flush with the inside surface of the oil seal carrier. Install seal with the spring-loaded lip toward the inside of the seal carrier.
   c. Drive the outer seal (double lip seal) until it is flush with the outside surface of the oil seal carrier. Install seal with the spring-loaded lip toward the inside of the seal carrier.
   d. Apply grease to the oil seal lips and to the oil seal sleeve surface on the output shaft.

Output Shaft Seal Carrier

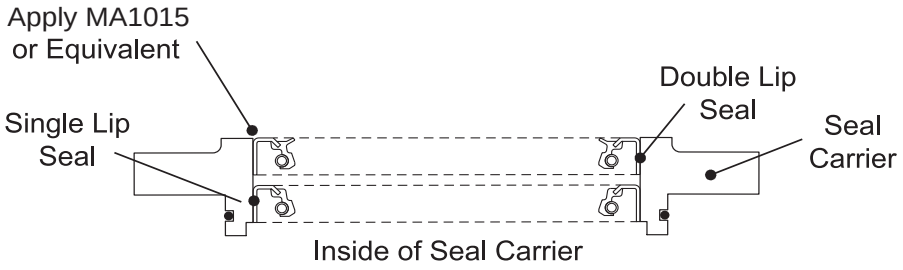


Figure 136. Output Shaft Seal Carrier Assembly

4. Install oil seal carrier (3) onto the output shaft.

5. Install the correct (previously selected) shim pack (4) onto the output shaft.

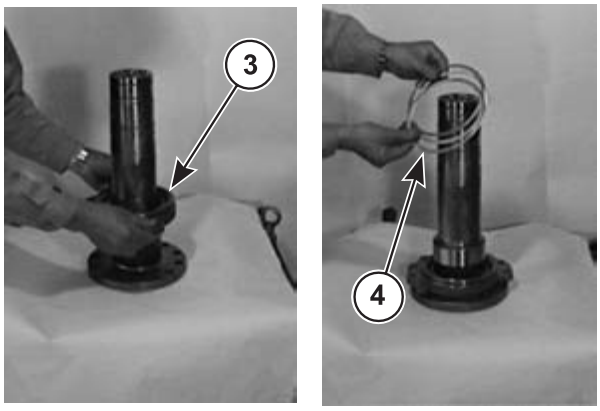


Figure 137. Oil Seal Carrier (3) and Shim Pack (4) Installation

6. Install the output shaft tapered roller bearing cup (5).

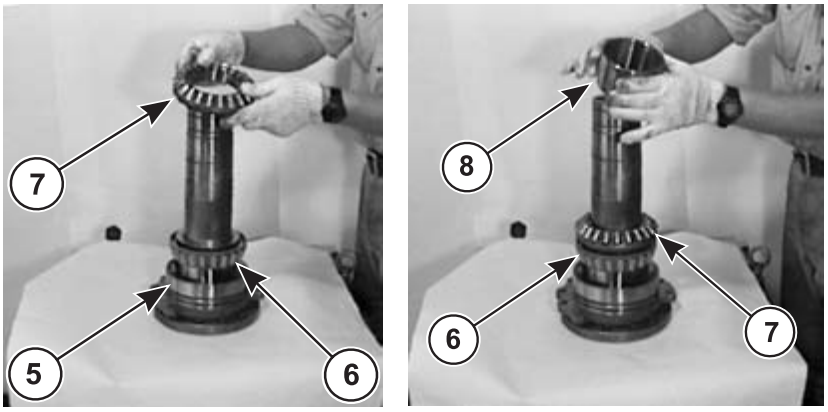
⚠ WARNING

The following steps of this procedure require components to be heated prior to installation. Use caution when handling the heated components.

7. Install the output shaft tapered roller bearing cone (6).
   a. Heat the output shaft tapered roller bearing cone to 120°C (250°F).
   b. Place the tapered roller bearing cone onto the output shaft with the small diameter end of the bearing toward the bearing cup. Slide the bearing onto the shaft until it contacts the shoulder of the output shaft seal sleeve.

8. Install the output shaft spherical roller bearing cone (7).
   a. Heat the output shaft spherical roller bearing cone to 120°C (250°F).
   b. Place the spherical roller bearing cone onto the output shaft with the large diameter of the bearing toward the bearing installed previously. Slide the bearing onto the shaft until it contacts the rear tapered roller bearing cone.

9. Install the bearing spacer (8).
   a. Heat the bearing spacer to 120°C (250°F).
   b. Place the bearing spacer onto the output shaft with the small diameter end towards the spherical bearing cone. Slide the bearing spacer onto the shaft until it contacts the spherical roller bearing race.

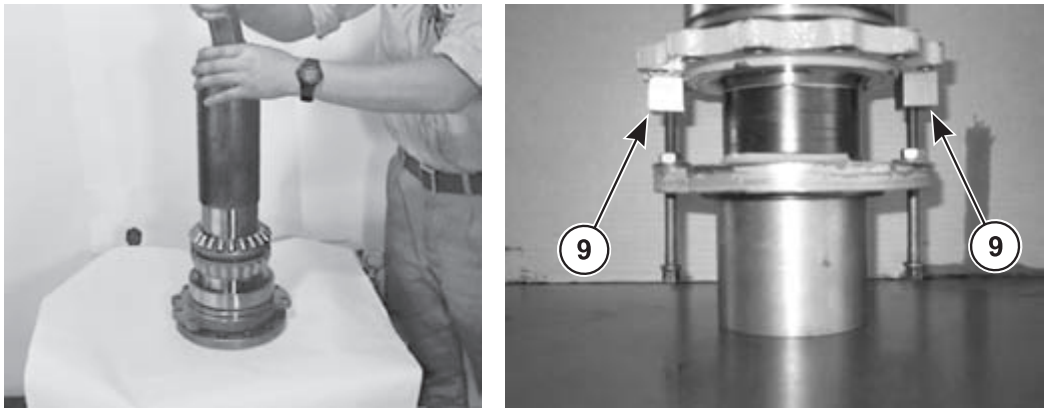


AAR222C-6557 AAR222B-6557

Figure 138. Tapered Bearing Cup (5), Tapered Bearing Cone (6), Spherical Roller Bearing Cone (7), and Bearing Spacer (8) Installation

10. Ensure the components are properly seated on the shaft. Use pressing sleeve tool T111146 and press to ensure the components are properly seated on the shaft.

11. Install tool T-21578-4 (9) to the output flange and seal carrier. The tool is used to maintain the position of the output shaft seal carrier during installation in the transmission housing. Maintaining the seal carrier position protects the seal during assembly into the transmission housing.



222A-6557 AR6557-1052

Figure 139. Pressing Output Shaft Component with Tool T111146 and Installing Tool T-21578-4 (9) on Seal Carrier

Preliminary Output Shaft/Gear Advancement Verification

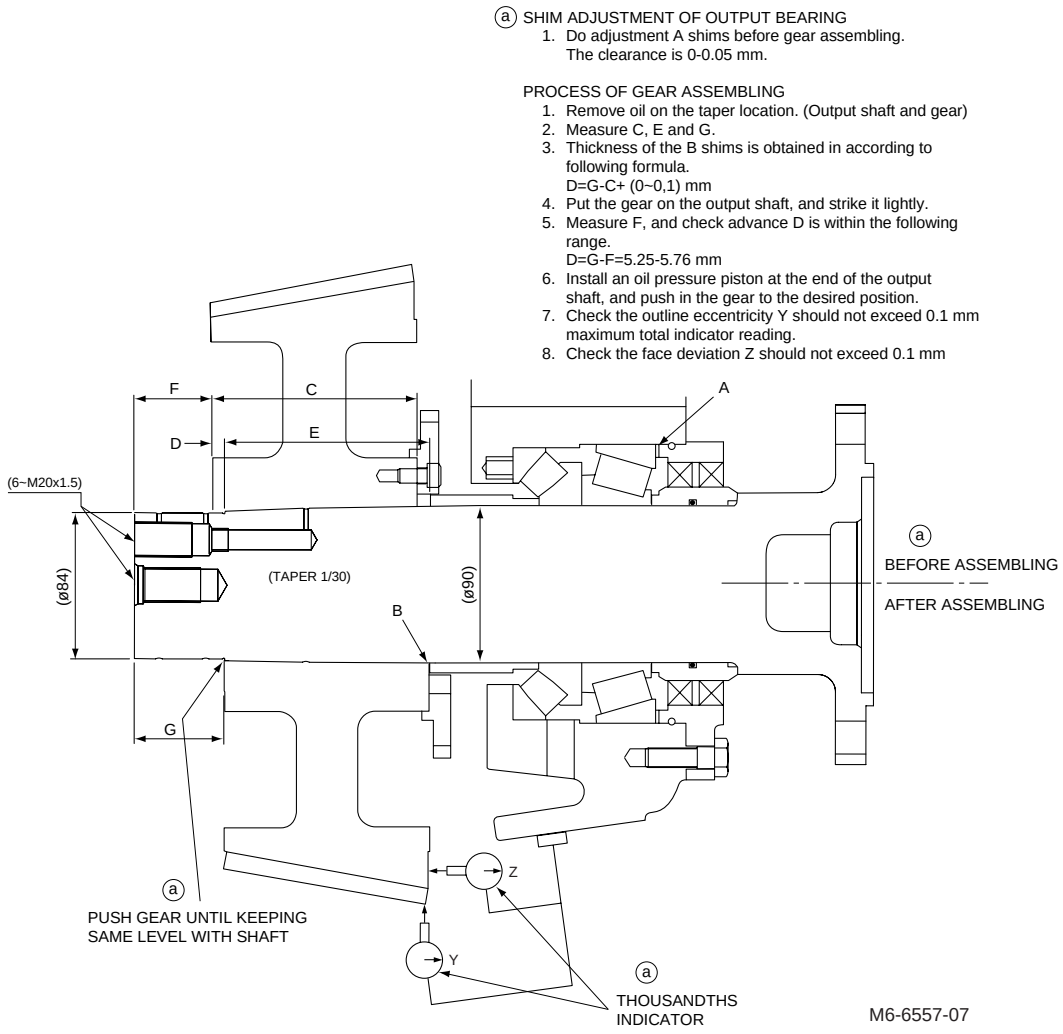

ⓐ SHIM ADJUSTMENT OF OUTPUT BEARING
1. Do adjustment A shims before gear assembling. The clearance is 0-0.05 mm.
PROCESS OF GEAR ASSEMBLING
1. Remove oil on the taper location. (Output shaft and gear)
2. Measure C, E and G.
3. Thickness of the B shims is obtained in according to following formula. D=G-C+ (0~0,1) mm
4. Put the gear on the output shaft, and strike it lightly.
5. Measure F, and check advance D is within the following range. D=G-F=5.25-5.76 mm
6. Install an oil pressure piston at the end of the output shaft, and push in the gear to the desired position.
7. Check the outline eccentricity Y should not exceed 0.1 mm maximum total indicator reading.
8. Check the face deviation Z should not exceed 0.1 mm
F
C
D
E
A
(6~M20x1.5)
(ø84)
(TAPER 1/30)
(ø90)
B
G
ⓐ
BEFORE ASSEMBLING
AFTER ASSEMBLING
Z
Y
ⓐ
PUSH GEAR UNTIL KEEPING SAME LEVEL WITH SHAFT
ⓐ
THOUSANDTHS INDICATOR
M6-6557-07

Figure 140. Output Shaft Advancement Procedure

1. Clean and inspect the output gear tapered bore.
   a. Prepare the gear tapered bore surface for assembly by using a Scotchbrite® pad to remove any burrs.
   b. Clean the shaft tapered surface and the gear bore with an appropriate solvent. Dry the shaft and clear all oil passages in the shaft with compressed air.

⚠ CAUTION

If the gear or shaft is damaged and cannot be repaired without material removal, replace the part.

⚠ CAUTION

The tapered surface of the shaft and matching tapered gear bore must be completely free of grease, oil dirt, and solvent residue. Failure to properly clean mating parts could prevent proper advance of the gear on the shaft and adversely effect torque carrying capacity of the assembled joint.

2. Install the trailing pump drive gear and spacer if they were removed from the output gear. Apply Loctite® 242 or 243 to the threads of the capscrews and torque them to 28 N•m (20 lb•ft). (Note that some units have roll pins instead of capscrews.)

3. Measure the output gear bore depth dimension (including spacer) as follows.

   Place the output gear and spacer on a flat uniform surface such as a layout table. Measure from the edge (5) of the output gear to the surface of the layout table. **DO NOT** include the thickness of the trailing pump drive gear.

   Measure in three locations around the circumference of the output gear bore. The three readings should be identical. Record this distance as dimension C (reference drawing).

   Gear Thickness Dimension C = _____

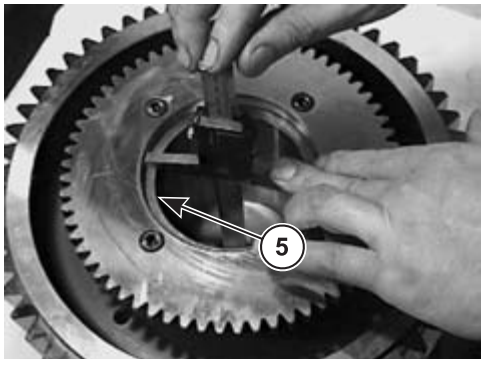
4. Measure the output shaft shoulder to spacer dimension as follows.

   Measure from the shaft shoulder to the front edge of the spacer (6) located next to the spherical roller bearing.

   Measure in three locations around the circumference of the shaft. The three readings should be identical.

   Record this distance as dimension E (reference drawing).

   Dimension E = _____



AAR234-6557

Figure 141. Output Gear Thickness Measurement (5)

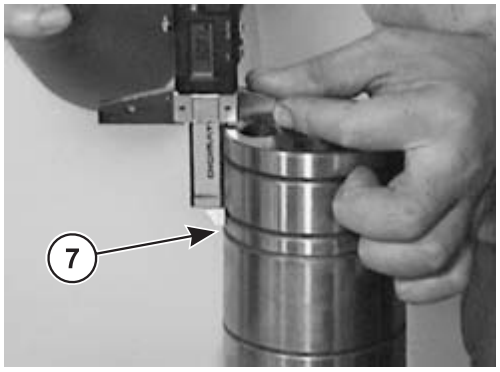
5. Measure the output shaft end to shoulder dimension as follows.
   Measure from the front end of the output shaft to the front edge of the shoulder (7) on the shaft.
   Measure in three locations around the circumference of the shaft. The three readings should be identical. Record this distance as dimension G (reference drawing).

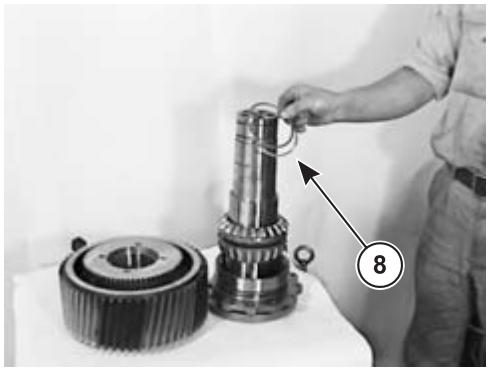
   Dimension G =_____

6. Calculate the correct shim pack (reference drawing dimension B) required to set the output gear advance on the output shaft as follows.
   Calculate the shims.
   Dimension (E) - (Dimension C) + (0.00 - 0.1 mm) = Shims (Dimension B).
   Dimension (E) - (Dimension C) + (0.00 - 0.004 in.) = Shims (Dimension B).

7. The calculated shim pack (8) will be installed on the output shaft between the spacer and the output gear.

   DO NOT install the shim pack at this time. The shim pack will be installed as the output shaft is lowered into the transmission housing.





AAR232-6557 AAR233B-6557

Figure 142. Shaft End to Shoulder (7) Measurement and Shim Pack Installation

8. Measure the expected gear advance to ensure it falls into the range 5.25 - 6.76 mm (0.207 - 0.266 in.) as follows.
   a. Place the gear on the output shaft. Seat the gear on the shaft by tapping it with a dead-blow hammer to measure expected gear advance.
   b. Measure from the front end of the output shaft to the front edge of the output gear. Record this distance as dimension F (reference drawing).

      Dimension F = _____

   c. Calculate the expected gear advance, dimension D (reference drawing).
      Dimension D = Dimension G - Dimension F
      Dimension D should fall into the range of 5.25 - 6.76 mm (0.207 - 0.266 in.).

⚠ CAUTION

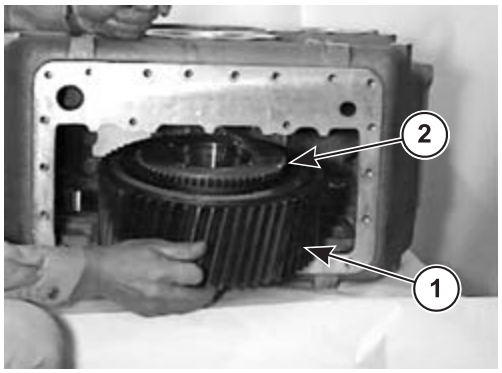
If the calculated advance falls outside the range given above, check to ensure all measurements/calculations are correct. If no errors are found it will be necessary to change parts. Contact the Product Service Department of Twin Disc, Incorporated.

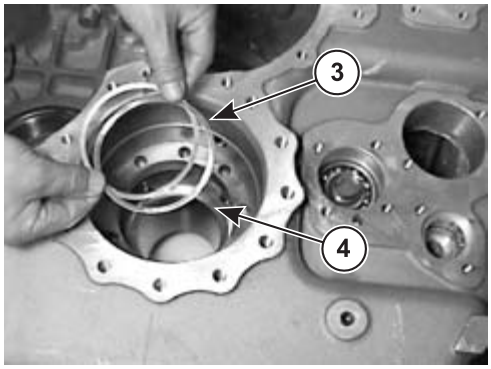
9. Ensure the output gear bore is clean and free of grease and other contaminants. Install two M10-1.5 eyebolts into the output gear (1) and place it in the transmission housing with the trailing pump drive gear (2) towards the rear side of the transmission housing. Align the output gear with the output shaft bore in the transmission housing.

⚠ CAUTION

The tapered surface of the shaft and matching tapered gear bore must be completely free of grease, oil dirt, and solvent residue. Failure to properly clean mating parts could prevent proper advance of the gear on the shaft and adversely effect torque carrying capacity of the assembled joint.

10. Place the shim pack (3) on top of the output gear bore (4). Ensure the shims are centered on the bore of the output gear.





AAR228D-6557 AAR228B-6557

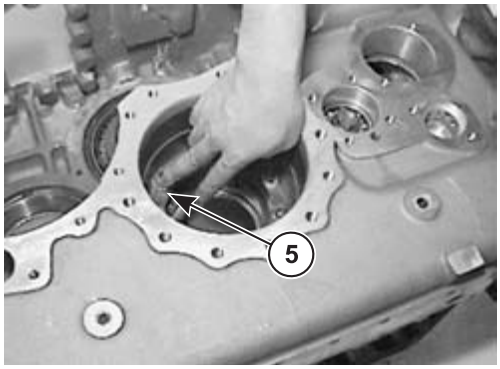
Figure 143. Output Gear (1) Placement in Transmission and Shim Installation

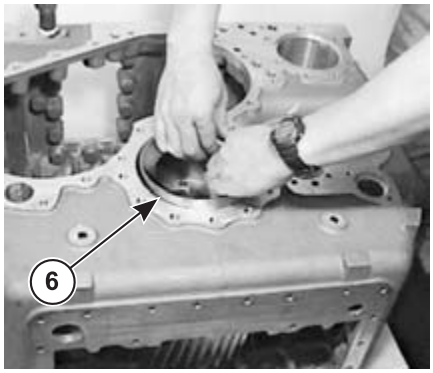
11. Fill the nine spring pockets in the bearing bore of the transmission housing with grease.

    Note: The grease will be used to retain the springs in the spring pockets while the transmission housing is rotated.

12. Install a spring in each of the spring pockets of the transmission housing. Ensure each spring is firmly held in its bore within the housing.

13. Install the spherical bearing cup into the transmission housing next to the springs. The spherical bearing cup is a slip fit in the transmission housing.





AAR229-6557 AAR228-6557

Figure 144. Output Shaft Bearing Spring (5) and Bearing Cup (6) Installation

14. Ensure the surface of the shaft taper is clean and free of grease and other contaminants. Lightly grease the output bore (7) of the transmission housing and the O-ring (8) of the seal retainer on the output shaft subassembly. Slowly lower the shaft subassembly into the transmission housing, through the shims and the output gear assembly.

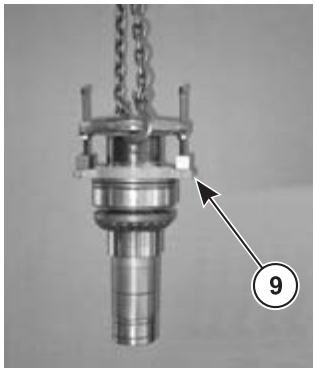
⚠ CAUTION

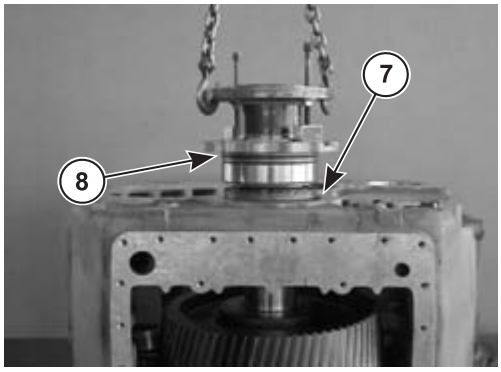
Carefully lower the shaft into the transmission housing as the seal carrier is installed into the housing. Damage to the shaft seals could result if appropriate care is not taken during the installation process.

15. Gently tap the end of the output shaft with a dead-blow hammer, if necessary, to guide the seal retainer into the housing.

Note: There will be a slight interference fit between the main housing and the seal retainer.

Note: When the shaft is installed, a small gap (9) will be present between the transmission housing and the seal retainer. This gap is a result of the springs installed between the transmission housing and the spherical bearing cup.





AR6557-1056BE AR6557-1074BE

Figure 145. Output Shaft Assembly Placement in Transmission Housing

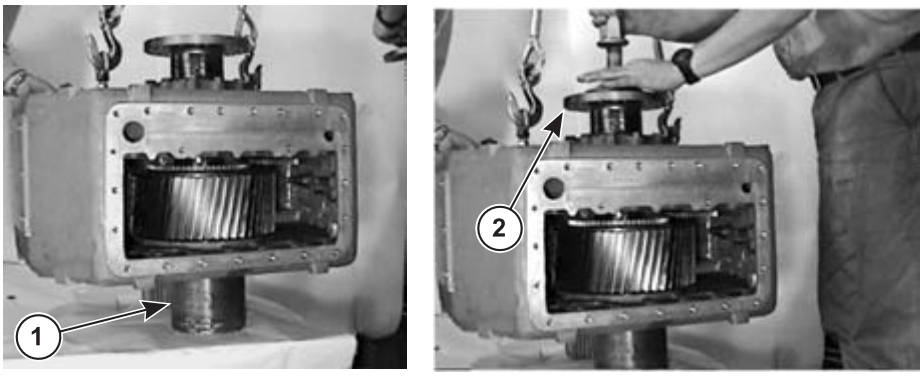
16. Install the seal retainer screws and tighten them evenly. Torque the screws to 80 N•m (59 lb•ft).

17. Raise the transmission housing. Support the output gear with special tool T111146 (1). Lower the transmission housing until the output gear (only the gear not the housing) is supported firmly by the tool.

18. Seat the shaft taper in the bore of the output gear. Use a mallet to tap firmly on the end of the output shaft flange (2), seating the tapered joint.

⚠ CAUTION

Monitor the position of the trailing pump drive and driven gear during output shaft installation to prevent interference of the gear teeth.

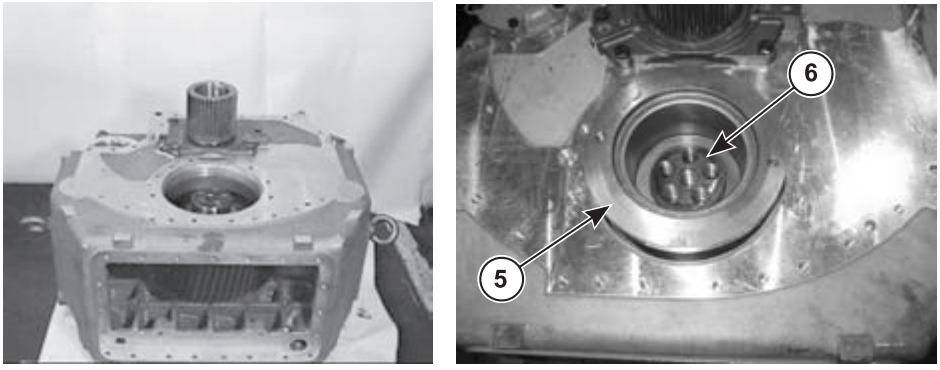


AAR244-6557 AAR251J-6557

Figure 146. Seating Output Gear on Output Shaft

19. Support gear with wood blocks. Install restraining tool T-21482-21.

20. Rotate transmission with the input end up. Remove restraining tool T-21482-21. Install tool T-21482 (5) over the output shaft assembly (6).

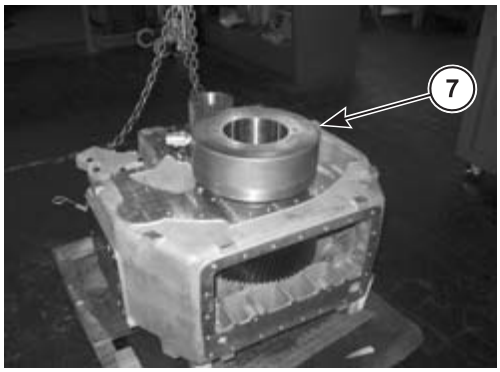


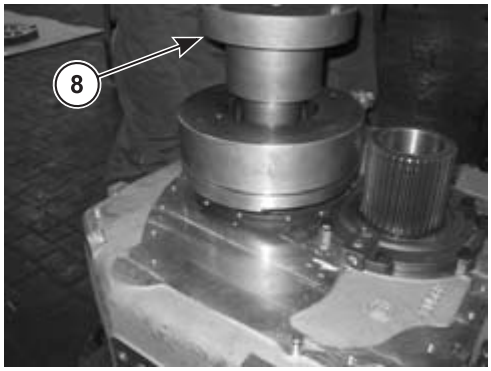
R247-6557 AAR6557-075BE

Figure 147. Tool T-21482 (5) Placement

21. Install tool T-21482-2 (7) over tool T-21482.

22. Install tool T-21482 (8) on top of tool T-21482-2.





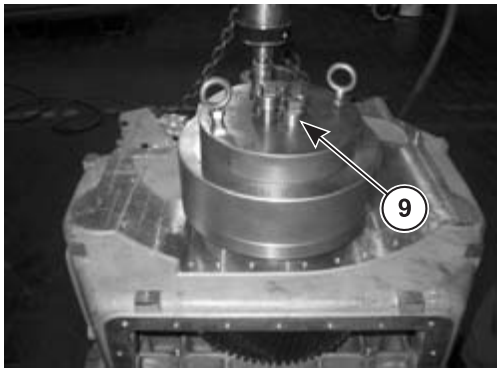
AAR6557-076BE AAR6557-078BE

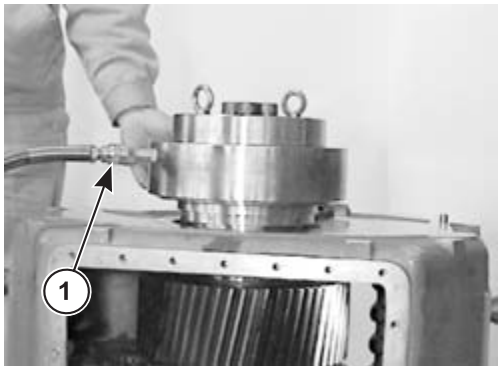
Figure 148. Installing Tool T-21482-2 (7) and T-21482 (8)

23. Connect tool T-21482 to the output shaft using the socket head capscrews (9). Tighten the capscrews to a torque of 500 N•m (360 lb•ft).

24. Connect a hydraulic power (1) supply to tool T-21482-2.

25. Seat the output gear on the output shaft taper with 50,000 kPa (7,250 psi). Hold the pressure on the assembly for a minimum of five minutes.





AAR6557-079BE AAR253A-6557

Figure 149. Using Tool T-21482 to seat the Output Gear on the Output Shaft

26. Remove tools T-21482 and T-21482-2.

27. Verify the output gear advancement on the output shaft.
    a. Measure the distance from the shaft shoulder (near the output gear) to the end of the shaft. Record this dimension as dimension D.

       Dimension D =_____

    b. Measure the distance from the edge of the output gear to the end of the output shaft. Record this dimension as dimension E.

       Dimension E =_____

    c. The differences between these two dimensions (E - D) should be 0.00 - 0.05 mm (0.00 - 0.002 inches).
    d. If the output gear requires further advancement, reinstall the tools and reapply pressure to advance the output gear.
       If the gear cannot be advanced the proper distance, the shim pack thickness should be checked. Checking the shim pack dimension will require disassembly.
    e. If the shim pack thickness is correct and the output gear cannot be advanced the proper distance, consult the Product Service Engineering Department at Twin Disc.

28. If the spherical roller bearing (2) was removed from the bearing carrier (3), heat the bearing to 120°C (250°F). Install the spherical roller bearing on the bearing carrier. Allow the bearing assembly to cool to room temperature prior to further assembly.

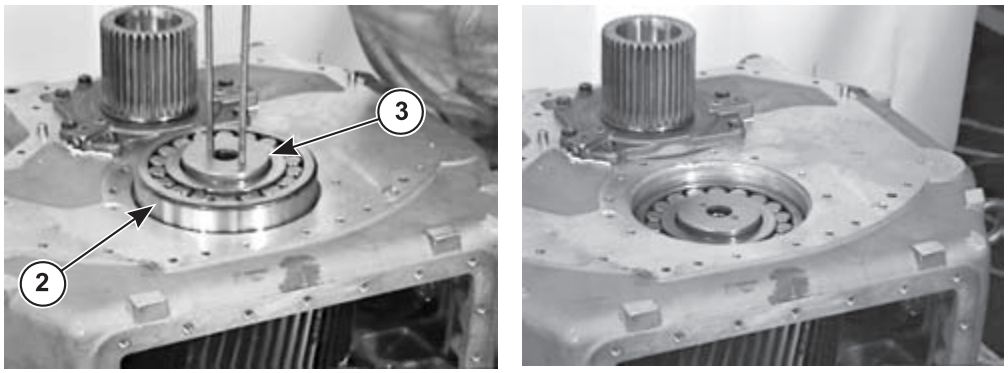
⚠ WARNING

Handle the output shaft spherical roller bearing with care. The bearing is HOT.

Lubricate the output shaft transmission housing bore and the output shaft with a thin film of grease.

29. Install the spherical roller bearing and carrier on the end of the output shaft. Carefully align the components with tool T-21578-1 to ease installation. Gently tap the outer bearing race and the bearing carrier, if necessary, to align the assembly during installation.

Note: If the spherical bearing becomes out of alignment, the assembly will become impossible.



AAR255AA-6557 R255A-6557

Figure 150. Spherical Bearing (2) Installation in Transmission Housing

30. Install the retaining rings (4) next to the spherical roller bearing, retaining the spherical roller bearing in the transmission housing.

AAR255B-6557 R255-6557

Figure 151. Retaining Ring (4) Installation

Gear Pan and Bottom Cover Installation

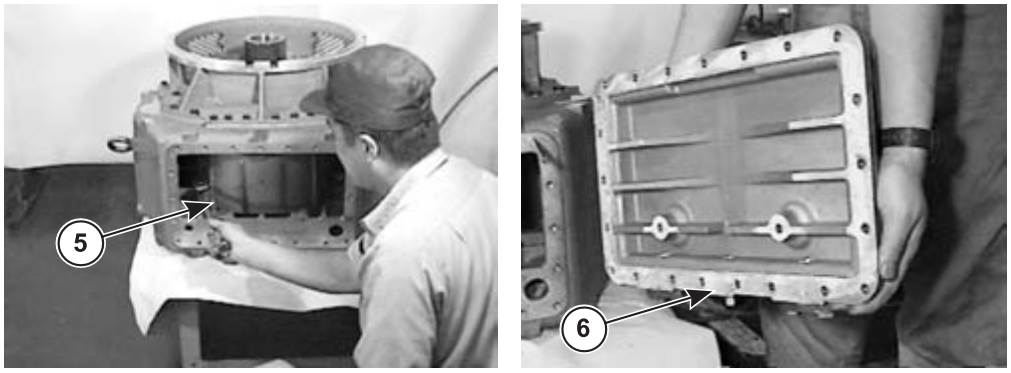
1. Install the gear pan (5) into the main transmission housing around the lower portion of the output gear. Torque the bolts to 46 N•m (34 lb•ft).

2. Place MA1015 on the sealing surface of the bottom cover (6). Place enough sealant on the housing to adequately seal the transmission bottom cover.

   Note: Apply nickel anti-seize compound to threads before torquing the screws (stainless steel) to 34 N•m (18 lb•ft).

⚠ IMPORTANT

Be sure to seal the surfaces around the two screws that pass through the center of the bottom cover. Leaks will result if the bottom cover is not properly sealed.



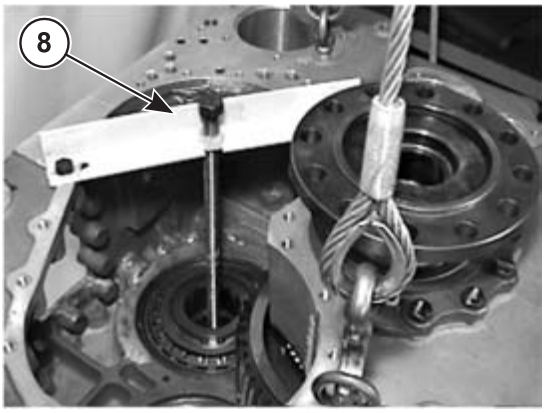
AAR260A-6557 AAR260-6557

Figure 152. Gear Pan (5) and Bottom Cover (6) Installation

3. Rotate the transmission and place it with the output side at the top. Use adequate blocking to protect the input sleeve splines and the front surface of the transmission housing. Be sure transmission is supported securely.

4. Remove the electrical tape from the output shaft surface.

5. Remove special tool T-111145 (8) used to hold the input drive sleeve in position while rotating the transmission housing.



AAR251I-6557

Figure 153. Remove Tool T-111145

Install Clutch Shaft Assemblies

Prepare Clutch Shaft Assemblies

The assembly of the primary and secondary shafts should have been done previously as described in that section of this manual.

Primary Shaft **Secondary Shaft**

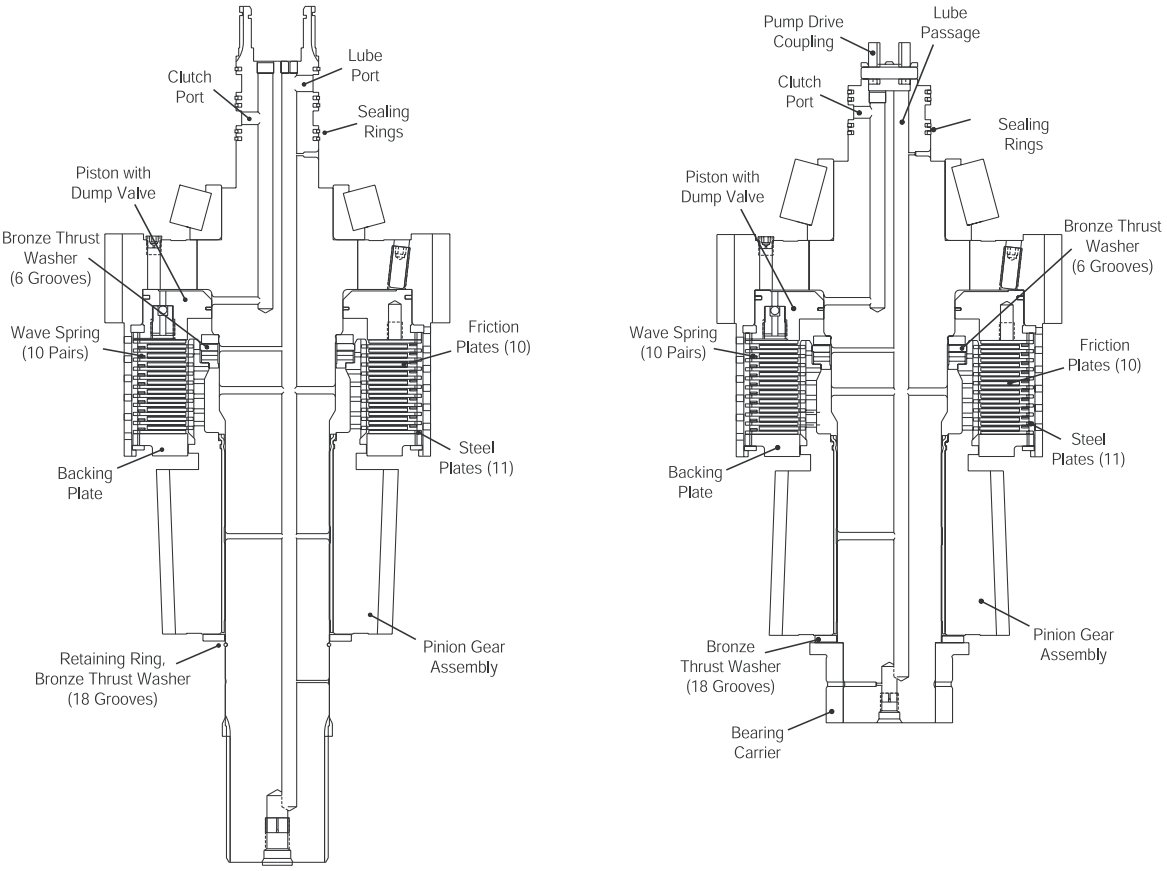


Figure 154. Primary and Secondary Clutch Shaft Component Identification and Location

Installing Primary and Secondary Shafts

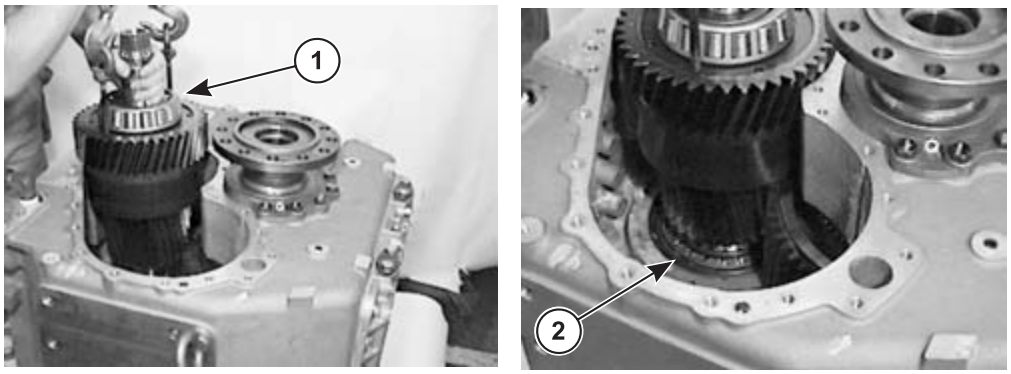
1. Install lifting eyes (M10-1.5) into the primary shaft clutch housing (1).

2. Lubricate the splined end of the primary shaft with grease. Install the primary shaft assembly into the transmission housing with a hoist. Carefully align the input drive sleeve and shaft splines (2) during installation.

   Note: In some instances it may be necessary to press the primary shaft splines into the splines of the input sleeve.

⚠ IMPORTANT

Be sure the primary shaft is fully engaged in the input drive sleeve before attempting to install the secondary shaft.



AAR261-6557 AAR262-6557

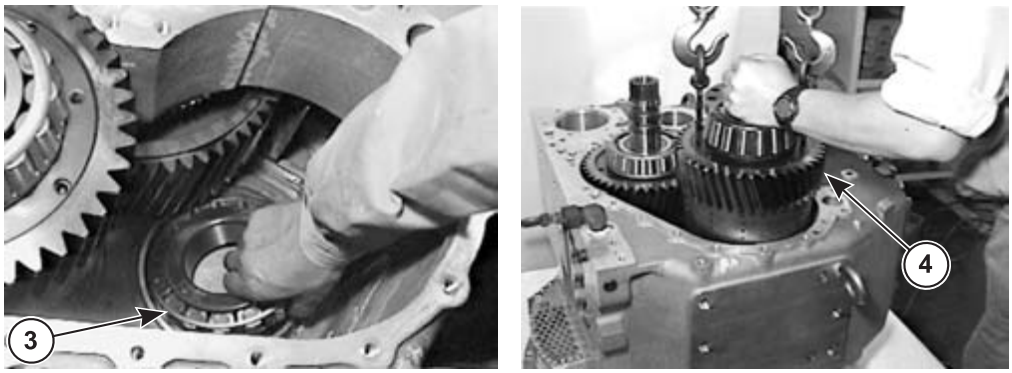
Figure 155. Lowering Primary Clutch Shaft into Transmission Housing

3. Install the front bearing cone (3) for the secondary shaft. Apply a thin film of grease to the inner bore of the bearing cone.

4. Apply a thin film of grease to the front bearing carrier on the secondary shaft. Install the secondary shaft assembly (4) into the transmission housing. The bearing carrier of the secondary shaft is a slip fit into the bore of the front bearing cone.

Note: Assembly will be difficult if the clutch shaft assembly is not perfectly aligned.

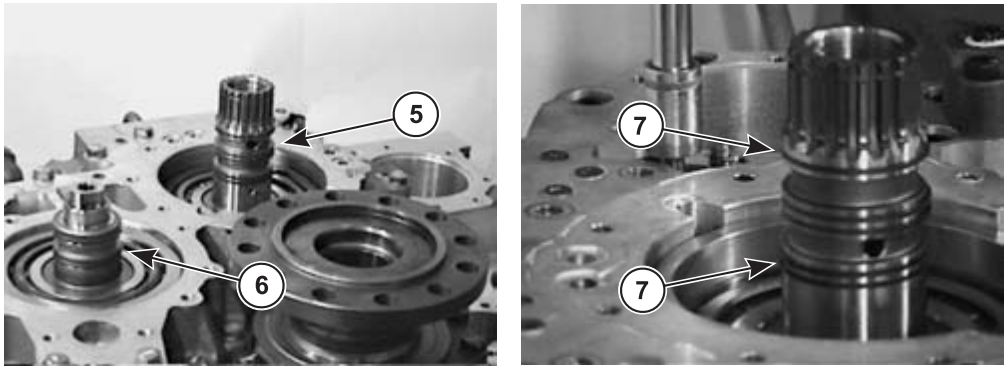
Note: The transfer gears on the primary and secondary shafts will protrude above the manifold sealing surface approximately 5 mm (0.20 inches).



AAR263-6557 AAR264A-6557

Figure 156. Secondary Clutch Shaft Bearing Cone (3) and Lowering Secondary Clutch Shaft into Transmission Housing

5. Install the sealing rings on the primary (5) and secondary (6) shafts. Apply a light coat of grease to all of the sealing rings (7).



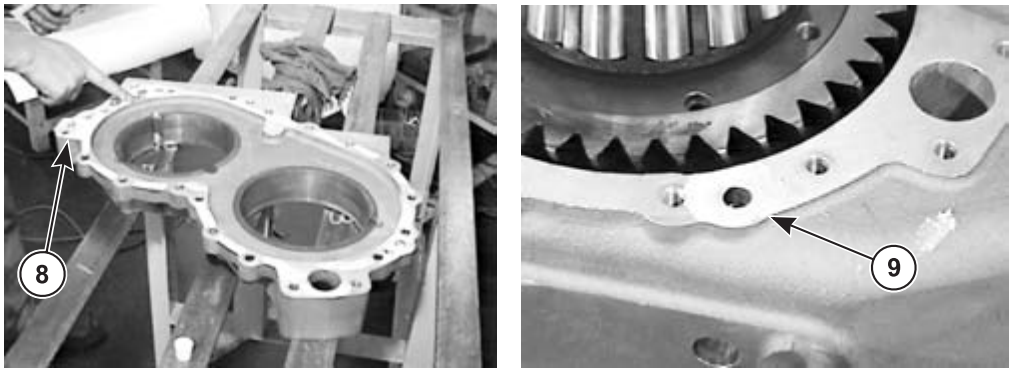
AAR270-6557 AAR073-6557

Figure 157. Clutch Shaft Sealing Ring Installation

Install Manifold

1. Place a thin film of MA1015 on the sealing surface (8) of both the manifold and housing.

2. Place MA1015 around the dowel pin holes (9) in the main transmission housing.



AAR265C-6557 AAR265B-6557

Figure 158. Seal Manifold Surface (8) and Dowel Pin (9) Locations

3. Install six O-rings (clutch ports and lube ports) into the main transmission housing counter bores (1).

4. Install the manifold (2) onto the main transmission housing.

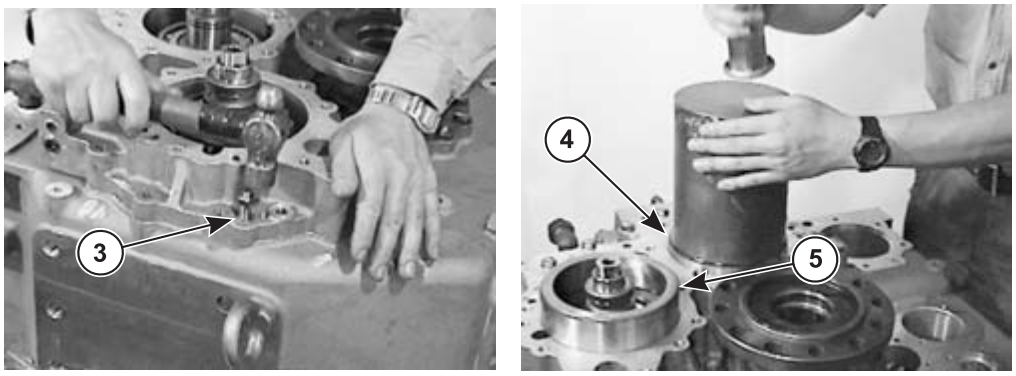
AAR265A-6557 AAR264-6557

Figure 159. Install O-rings (1) in Transmission Counter Bores

5. Install the manifold to housing screws loosely. Loosen the dowel pin nuts on the manifold. Drive the dowel pins (3) into the housing to locate the manifold properly on the transmission housing. Tighten (snug only) the dowel pin nuts to hold the manifold in place. Torque the manifold screws to 46 N•m (34 lb•ft).

6. Install the primary shaft rear bearing cup (4). Install the secondary shaft rear bearing cup (5).

7. Lightly press the primary and secondary shaft rear bearing cups into position on the bearing cones with tool T-21482-31.



AAR273-6557 AAR271-6557

Figure 160. Install Dowel Pins (3) and Bearing Cups (4 and 5)

Adjust Primary Shaft Bearing Clearance

1. Measure the depth (6) of the primary shaft tapered roller bearing cup in the transmission housing. Measure from the machined surface of the transmission housing to the rear surface of the tapered roller bearing cup.
   Measure in three locations around the circumference of the bearing bore. The three readings should be identical. If the dimensions are not identical, realign the bearing cup. Record this dimension.

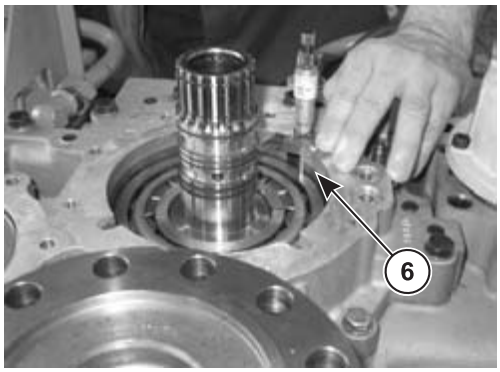
   Bearing Bore Depth = _____

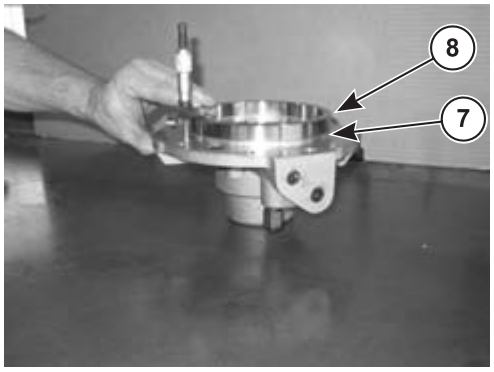
2. Measure the length of the primary shaft rear cover pilot (7) and bearing spacer (8). Measure from the bearing contact point to the rear mounting surface of the cover.
   Measure in three locations around the circumference of the rear cover. The three readings should be identical. Record this dimension.

   Rear Cover Pilot Dimension = _____

3. Calculate the correct shim pack required to set the primary shaft rear bearings.
   a. Subtract the primary shaft rear cover and spacer dimension from the transmission housing to rear bearing cup dimension.
      Bearing Bore Dimension - (Cover + Spacer Dimension) = Pinion Shaft Clearance.
   b. Calculate the shim pack thickness required to obtain -0.05 (preload) to +0.05 mm (-0.002 preload to +0.002 inches) clutch shaft clearance when the shim pack is installed.

4. The calculated shim pack will be installed on the primary shaft between the spacer and the rear cover.





AR6557-1048BE AR6557-1047BE

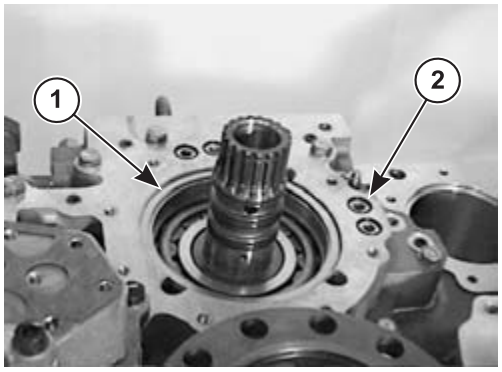
Figure 161. Measuring Components to Determine Primary Clutch Shaft Bearing Adjustment

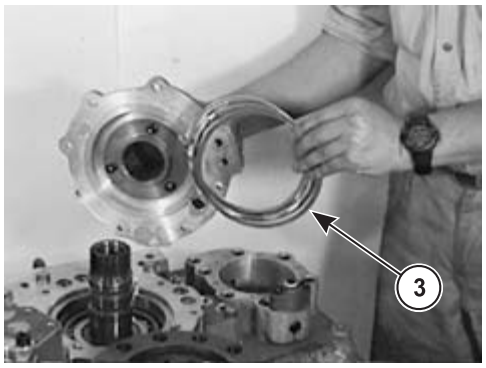
Primary Shaft Cover Installation

Note: Verify new piston sealing rings are installed on the primary shaft (quantity 5) and secondary shaft (quantity 4) before cover installation.

1. Install the spacer (1) next to the primary shaft rear bearing cup. Install O-rings (clutch ports and lube ports) into the counter bores (2) in the manifold housing.

2. Install the shim pack (3) on top of the spacer. Place the thickest shims on the outside of the shim pack and the thinnest shims in the center of the shim pack.





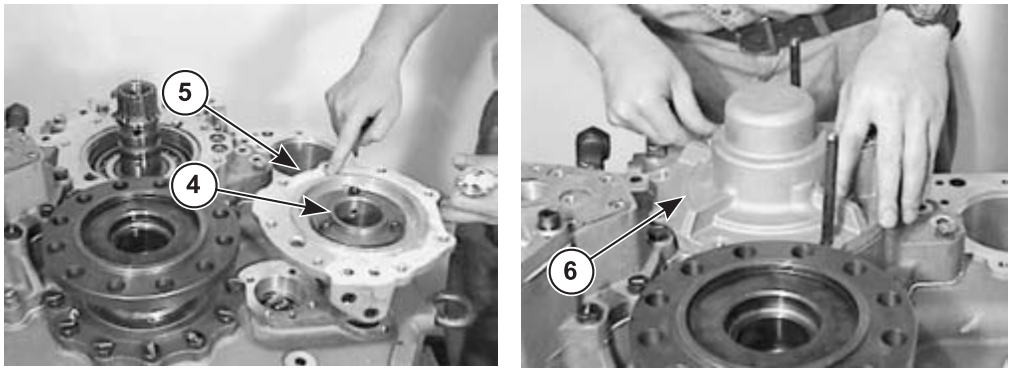
AAR284-6557 AAR054-6557

Figure 162. Primary Clutch Shaft Bearing Spacer (1), O-ring (2), and Shim (3) Installation

3. Lubricate the bore (4) of the primary clutch shaft rear cover.

4. Place MA1015 on the sealing surface (5) of the primary clutch shaft rear cover.

5. Install primary clutch shaft cover (6). Torque the screws to 46 N•m (34 lb•ft).



AAR285-6557 AAR287-6557

Figure 163. Seal (5) and Install Primary Clutch Shaft Cover (6)

Set Secondary Shaft Bearing Clearance

1. Measure the depth of the secondary clutch shaft tapered roller bearing cup in the transmission housing. Measure from the machined surface of the transmission housing to the rear surface of the tapered roller bearing cup.
   Measure in three locations around the circumference of the bearing bore. The three readings should be identical. If the dimensions are not identical, realign the bearing cup. Record this dimension.

   Bearing Bore Depth = _____

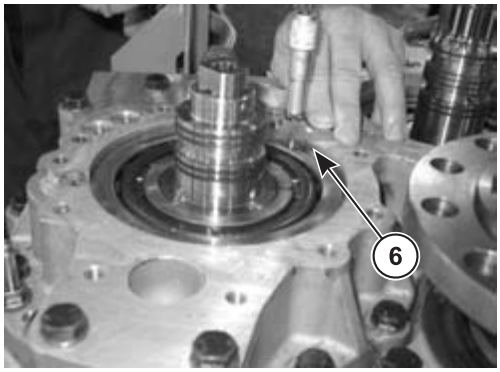
2. Measure the length of the pump mount pilot. Measure from the bearing contact point to the rear mounting surface of the cover.
   Measure in three locations around the circumference of the pump mount. The three readings should be identical. Record this dimension.

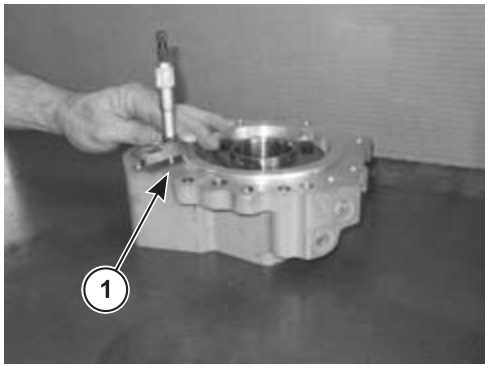
   Pump Mount Pilot Dimension = _____

   Note: The secondary shaft does not use a spacer between the rear bearing cup and the rear shaft cover.

3. Calculate the correct shim pack required to set the secondary clutch shaft rear bearings.
   a. Subtract the secondary clutch shaft rear cover dimension from the transmission housing to rear bearing cup dimension.
      Bearing Bore Dimension - (Cover Dimension) = Pinion Shaft Clearance.
   b. Calculate the shim pack thickness required to obtain -0.05 preload to +0.05 mm (-0.002 preload to +0.002 inches) clutch shaft clearance when the shim pack is installed.

4. The calculated shim pack will be installed on the secondary clutch shaft between the bearing cup and the rear cover.





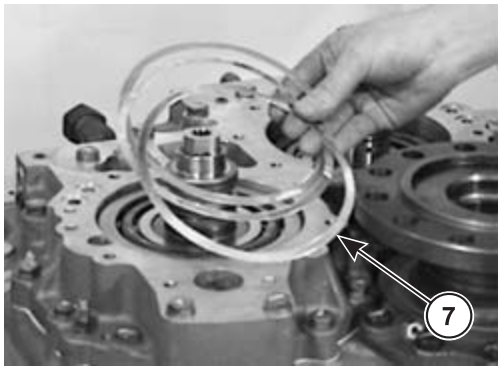
AR6557-1049BE AR6557-1045BE

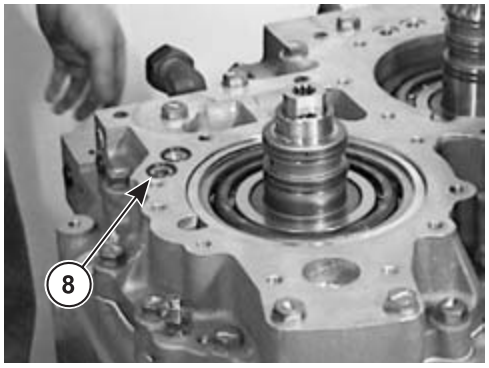
Figure 164. Measuring Components to Determine Secondary Clutch Shaft Bearing Adjustment

Pump Mount Installation

1. Install the secondary shaft shim pack (7) on top of the rear bearing cup. Place the thickest shims on the outside of the shim pack and the thinnest shims in the center of the shim pack.

2. Install the secondary shaft O-rings into the counter bores (8) in the manifold housing.





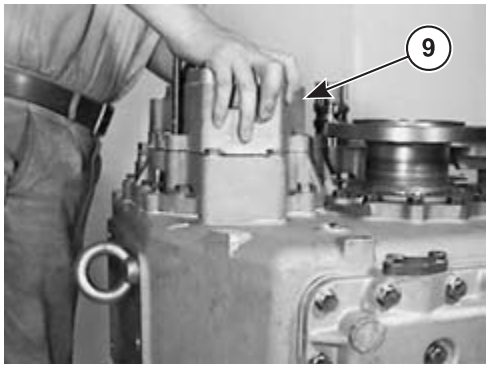
AAR278R-6557 AAR279-6557

Figure 165. Secondary Clutch Shaft Bearing Shim (7) and O-ring (8) Installation

3. Place MA1015 on the sealing surface of the pump mount (secondary shaft rear cover).

   Note: Place sealant on the sealing surface of the pump mount and pump suction port.

4. Install the pump mounting (9) cover (secondary shaft rear cover). Torque the screws to 46 N•m (34 lb•ft).



R6557-003BE AAR280-6557

Figure 166. Seal and Install Pump Mount (9)

Transmission External Components

Pump and Suction Screen Installation

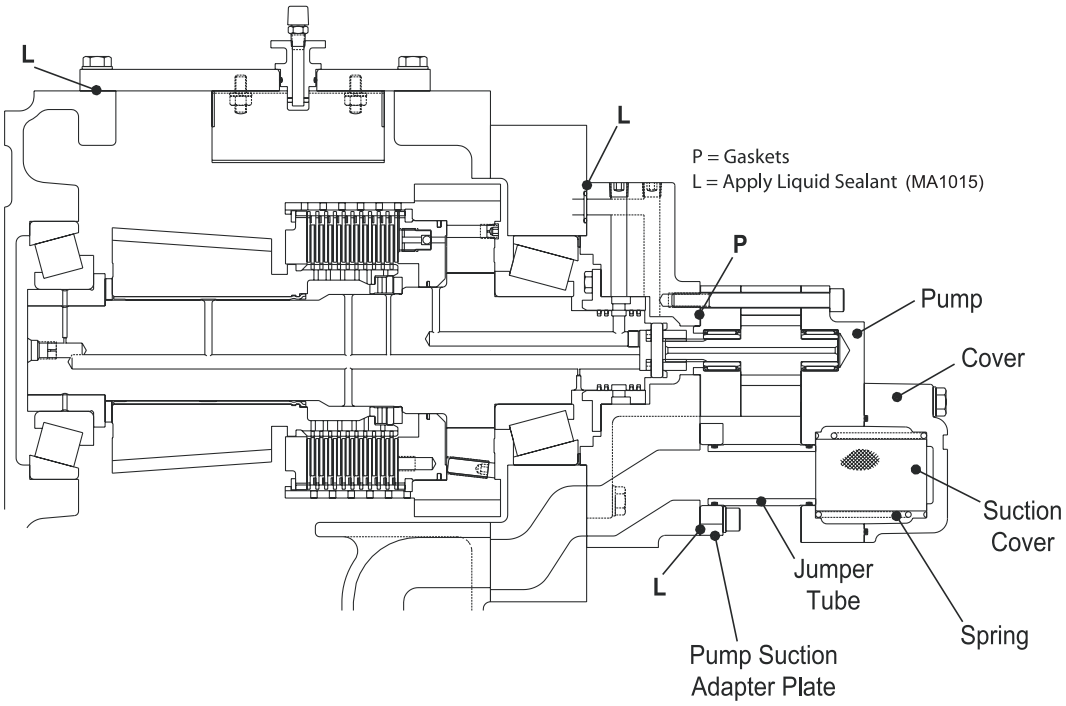


Figure 167. Pump Component Identification and Location

1. Place MA1015 on the sealing surface of the pump suction adapter plate.

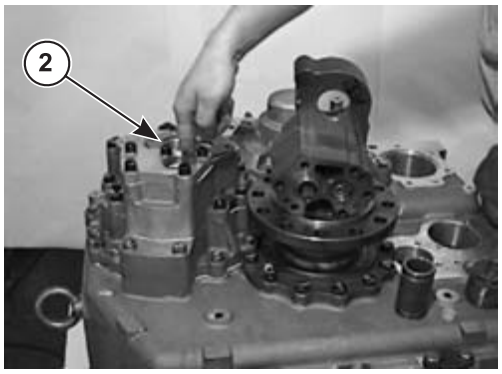
2. Install the pump suction adapter plate (1) (if removed). Torque the screws to 46 N•m (34 lb•ft).

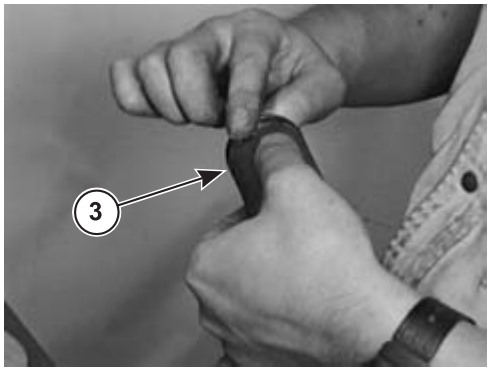
AR281-6557

Figure 168. Seal and Install Pump Suction Adapter Plate (1)

3. Lubricate the pump suction jumper tube bore (2).

4. Install O-rings on each end of the pump jumper tube (3). Lubricate the O-rings.





AAR288-6557 AAR289-6557

Figure 169. Jumper Tube (3) Lubrication

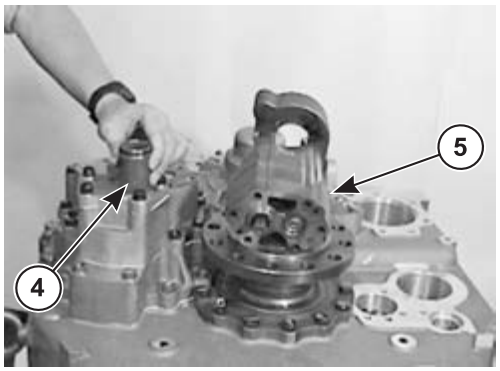
5. Install the pump mounting gasket.

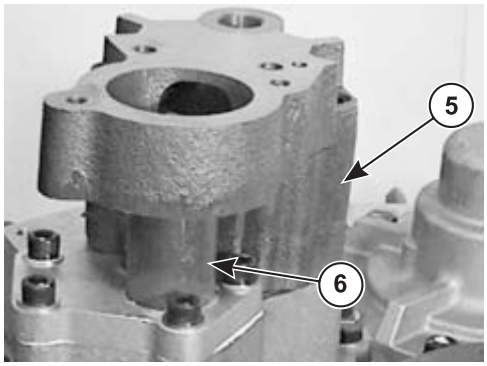
Note: The larger of the two round holes is for the pump shaft.

6. Install the jumper tube (4) into the pump suction adapter plate.

7. Install the pump (5). It may be necessary to rotate the primary shaft to allow the pump shaft to align during installation. Torque the screws to 46 N•m (34 lb•ft).

   Note: The jumper tube (6) should rotate freely by hand with the O-rings installed after the pump is mounted and the bolts are tightened.





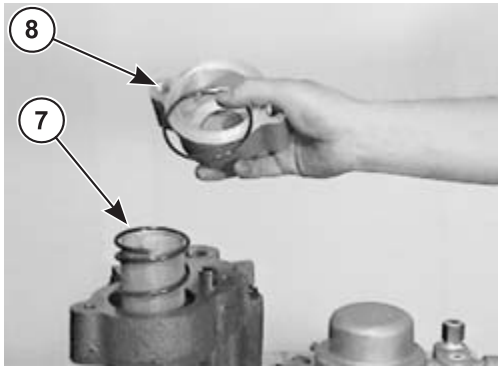
AAR290-6557 AAR293-6557

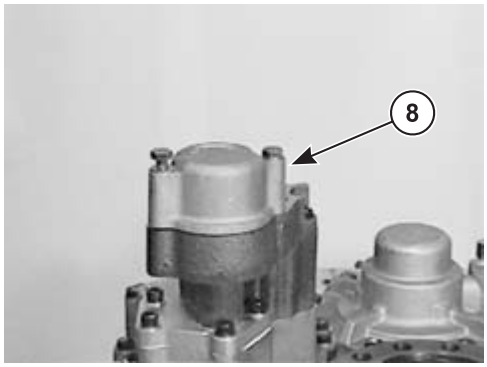
Figure 170. Jumper Tube (4) and Pump (5) Installation

8. Install the suction strainer (7).

9. Install the suction strainer O-ring and cover (8). Torque the screws to 45 N•m (33 lb•ft).

   Note: Do not crush the suction strainer.





AAR295-6557 AAR296-6557

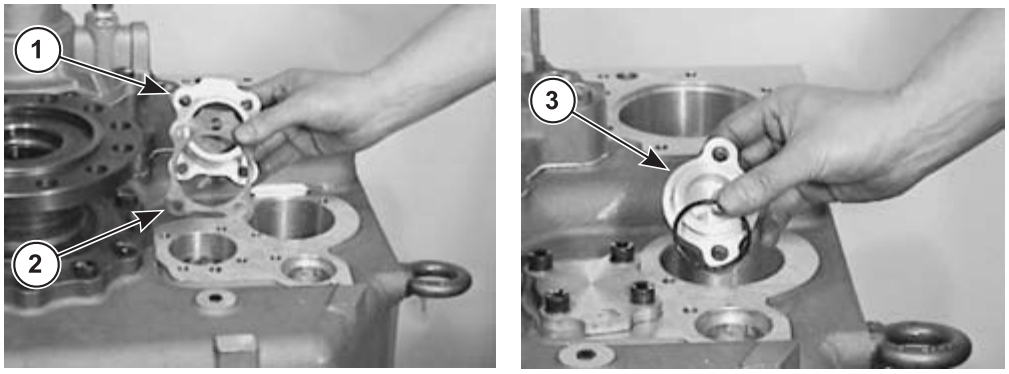
Figure 171. Suction Strainer (7) and Cover (8) Installation

Trailing Pump and Governor Cover Installation

1. Install the trailing pump cover (1) and gasket (2). Torque the screws to 46 N•m (34lb•ft).

   Note: If the transmission is equipped with a trailing pump, install the suction screen into the housing.

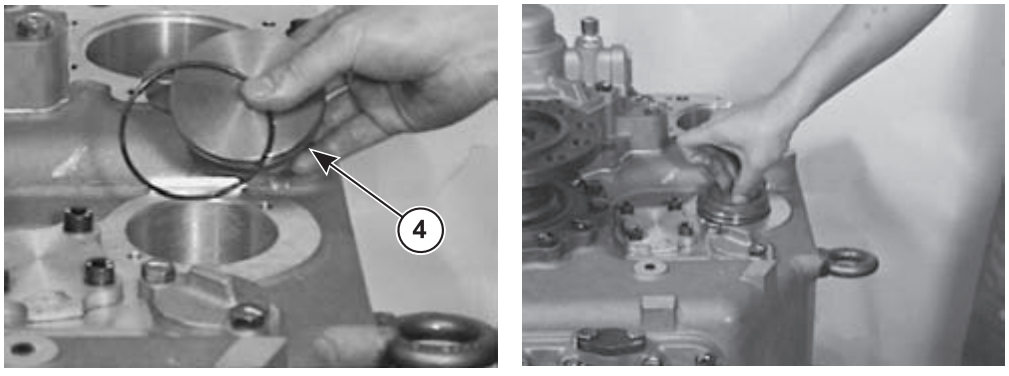
2. Lubricate and install the trailing pump suction port O-ring and cover (3). Torque the screws to 45 N•m (33 lb•ft).



AAR298-6557 AAR299-6557

Figure 172. Trailing Pump Cover (1) and Gasket (2) Installation

3. Lubricate and install the governor cover (4) and O-ring. Torque the screw to 45 N•m (33 lb•ft).



AAR303-6557 R301-6557

Figure 173. Governor Cover (4) Installation

Heat Exchanger Installation

Heat exchangers furnished by Twin Disc to be used in salt water applications have zinc anode rods installed at the heat exchanger inlet and outlet heads. These rods must be checked every 90 days. If over 50% of the rod is disintegrated, it should be replaced to provide effective protection.

Excessive corrosion of the zinc anode rod indicates electrolytic action. A careful inspection should be made to determine if this action is caused by a short circuit or externally grounded electrical current. If these conditions do not exist, it is evident the corrosion is due to local electrolysis.

If the zinc anode rods are corroded with foreign materials, they should be cleaned with a wire brush.

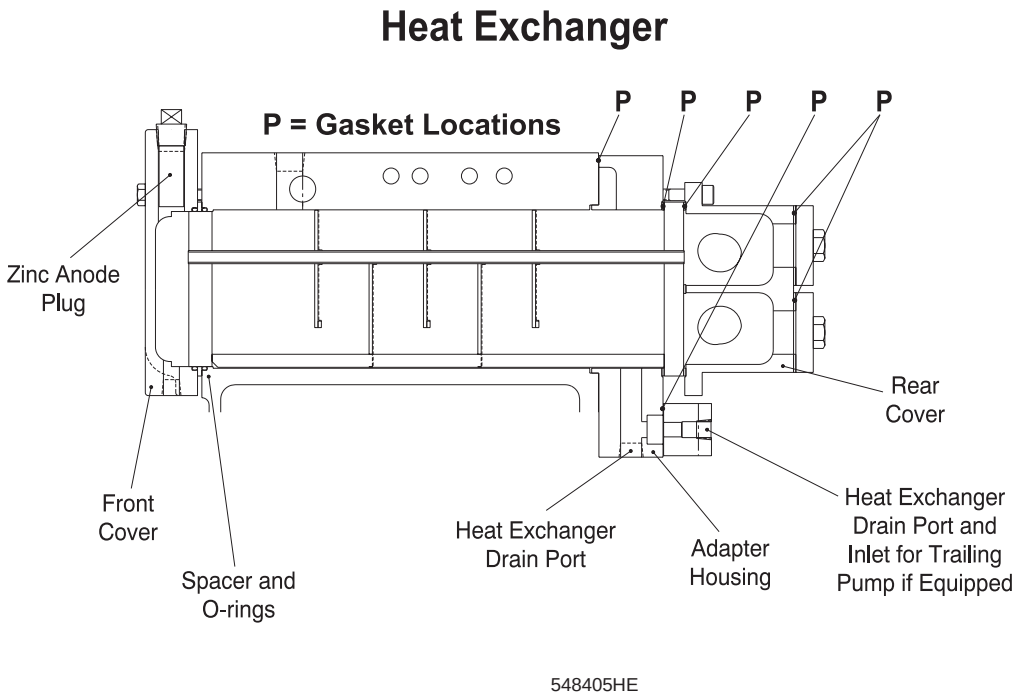
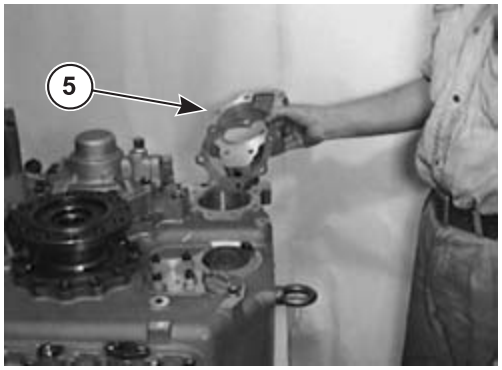
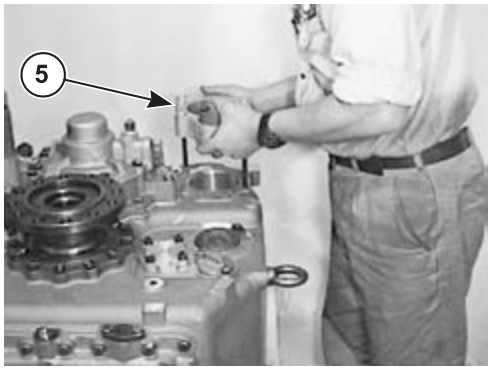


Figure 174. Heat Exchanger Component Identification and Location

1. Install the heat exchanger base (5) and gasket. Torque the mounting screws to a value of 46 N•m (34 lb•ft).

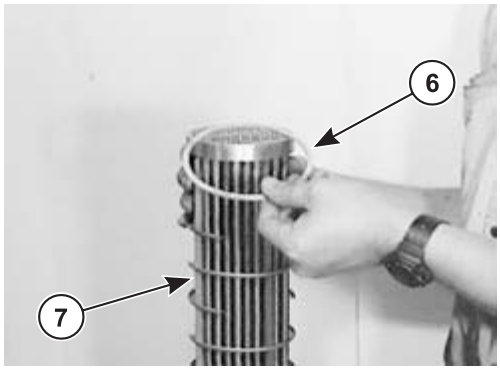


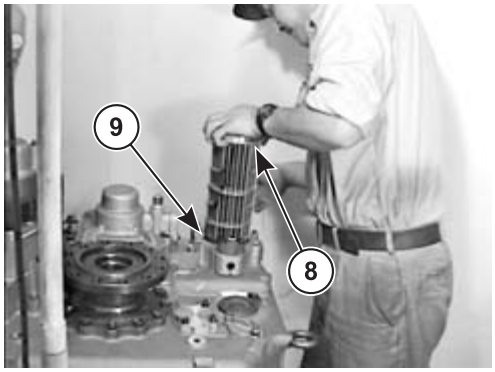


AAR302-6557 AAR305-6557

Figure 175. Heat Exchanger Adapter Plate Housing (5)

2. Install the gasket (6) and heat exchanger (7). The gasket is placed between the flange (8) on the heat exchanger and the base (9).





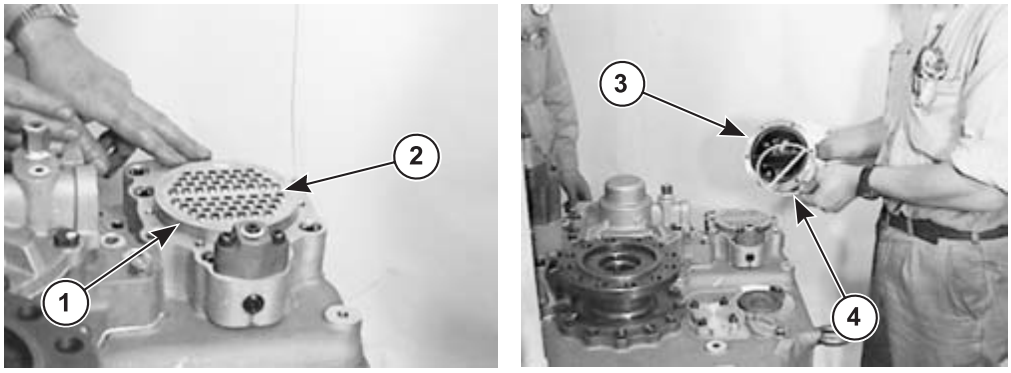
AAR306-6557 AAR308A-6557

Figure 176. Heat Exchanger Gasket (6) and Core (7) Installation

3. Install the heat exchanger (1) with the mark made during disassembly at the top.

   Place the heat exchanger into the transmission housing with the divider (2) located horizontally in the housing. The divider in the heat exchanger, along with the rear cover (3) and gasket (4), separates the inlet from the outlet of the heat exchanger.

   Note: If the heat exchanger is not properly installed in the transmission housing, the transmission could overheat.



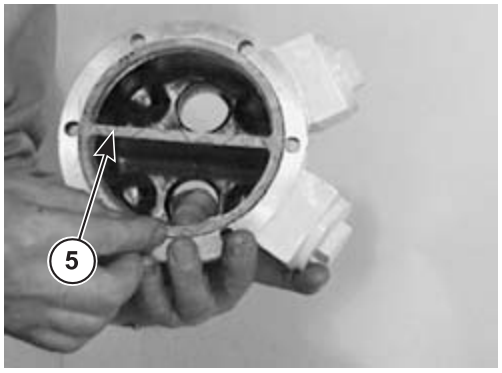
AAR309-6557 AAR311-6557

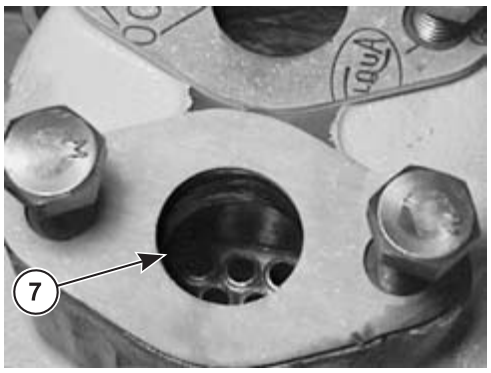
Figure 177. Heat Exchanger Core (1) Placement

4. Apply grease between the rear cover and gasket of the heat exchanger. Attach the heat exchanger gasket (5) to the rear cover with the grease.

   Install the heat exchanger rear cover. The heat exchanger positioning can be verified by viewing the heat exchanger through the inlet/outlet ports (7). The divider should not be out of position when viewed through the inlet/outlet ports. Torque the screws evenly to 38 N•m (28 lb•ft).

   Note: Improper tightening of the heat exchanger rear cover could cause damage to the cover.





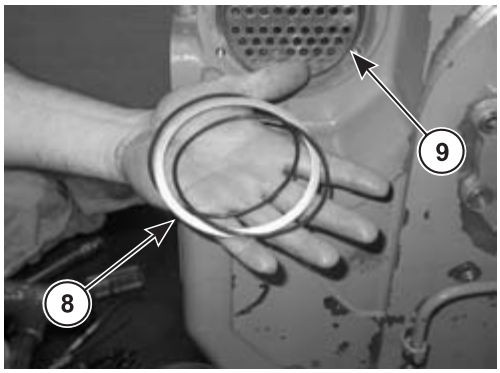
AAR312-6557 AAR313-6557

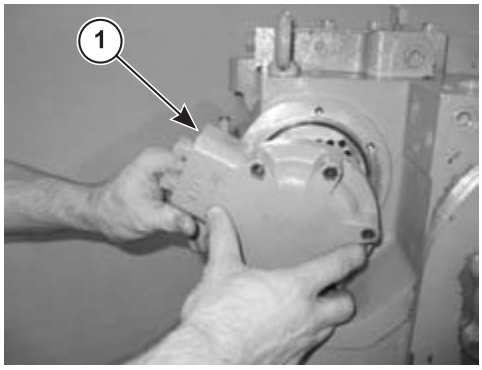
Figure 178. Heat Exchanger Cover and Gasket (5) Installation

5. Place the transmission housing in the upright position.
   a. Lubricate, then install an O-ring over the front of the heat exchanger (9).
   b. Install the spacer next to the O-ring.
   c. Lubricate then install an O-ring over the front of the heat exchanger next to the spacer.

6. Place the screws into the front cover (1) of the heat exchanger. Install the front cover over the heat exchanger. Tighten the heat exchanger cover screws evenly to a torque of 38 N•m (28 lb•ft).

   Note: Tighten the six screws evenly to prevent damage.





AR6557-1042BE AR6557-1043BE

Figure 179. Heat Exchanger Front Seals (8) and Front Cover (1)

Assembly and Installation of Control Valve

Assembly of Electrical Control Valve (upperbody half)

1. Install one dowel pin (large diameter) into each of the two bores of the valve body.

2. Install one spring into each of the two bores of the valve body.

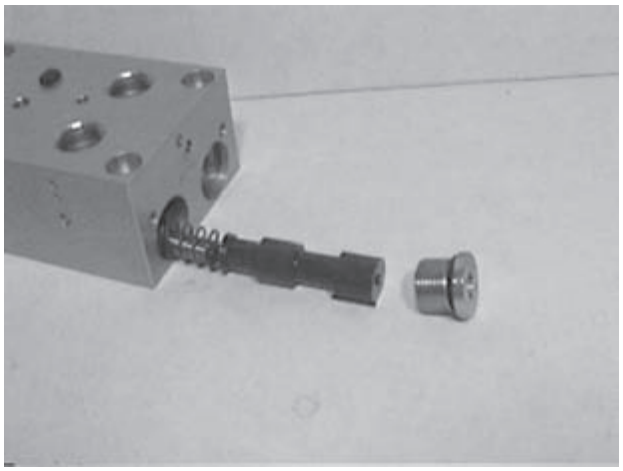


Figure 180. Dowel, Return Spring, Spool, and Plug

3. Install one spool into each of the two bores of the valve body.

4. On units equipped with the hydraulic lock feature, install one spring followed by one pin (small diameter) into each of the spools.

5. Install the two O-ring plugs into the valve body and tighten to 85 N•m (63 lb•ft.)

6. Apply lubricant (such as Dow Corning 200® 30,000cSt fluid) to the O-rings of the solenoids and plug (plug used on units without hydraulic lock). Install solenoids (and plug, if equipped) into the valve body and torque them to 34 N•m (25 lb•ft).

7. Insert the wires (pins) into the Weatherpak connector according to the location markings made at disassembly. Close the end of the Weatherpak connector to lock the wires in position.

8. Install the Weatherpak connector onto its retaining clip on the top of the valve body.

Assembly of Electrical Control Valve (lower body half)

1. Install the steel shuttle ball into its bore in the valve body.

2. Install the O-ring onto the shuttle ball seat.

3. Apply lubricant such as Dow Corning 200® 30,000cSt fluid to the O-ring, and install the seat into the valve body. Be sure to align the roll pin holes in the seat with the holes in the valve body. One of the valve's M8x1.25 cover screws threaded into the seat can be used to adjust the seat location in the valve body.

4. Install the roll pin to retain the shuttle ball seat. Drive the roll pin in until it is flush with the gasket surface of the valve body.

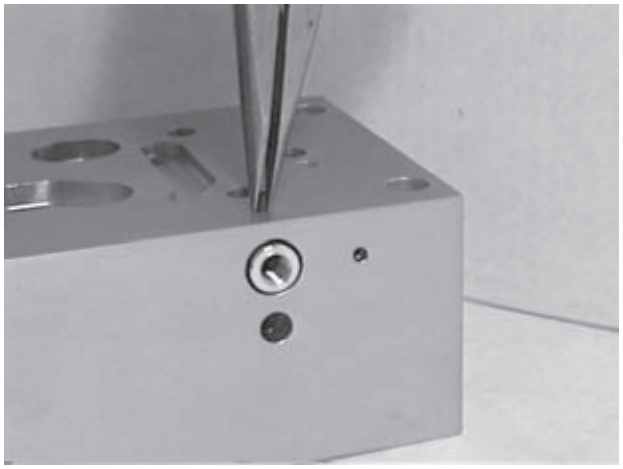


Figure 181. Installing Shuttle Ball Seat Roll Pin

5. Install the stem into the valve body, aligning the slot in the stem with the threaded hole in the valve body for the dog-point setscrew. Be sure the slot in the stem is aligned with the setscrew hole in the valve body to prevent damage to the stem and valve body.

6. Apply MA908 threadlocker to the threads of the dog-point setscrew and install. Tighten the dog-point setscrew until snug, then back off 1/2 turn.

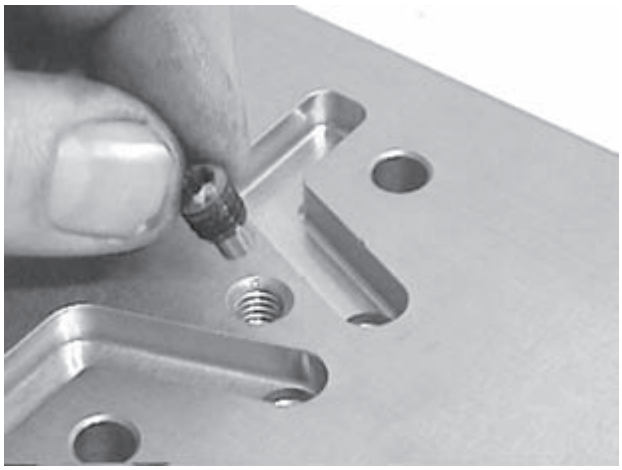


Figure 182. Installing Dog-point Setscrew

7. Install the steel detent ball into the valve body.

8. Install the detent spring over the detent ball.

9. Apply MA908 threadlocker to the threads of the hollow setscrew and install into the threaded hole. A stepped Allen wrench, or one wrapped with tape will ease the installation of the hollow setscrew. Tighten the setscrew until it is flush with the gasket surface of the valve body. Check the stem rotation and detent action.

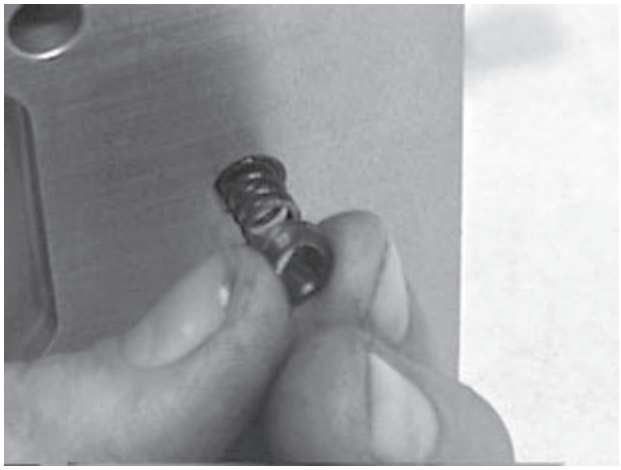


Figure 183. Installing Detent Ball Setscrew

10. Install the thrust washer over the end of the stem.

11. Press the oil seal into the cover assembly until flush with the adjacent cover surface.

12. Install the O-ring into the counterbore in the cover assembly.

13. Apply grease to the stem, O-ring, and oil seal lip.

14. Install cover assembly and gasket onto valve body. Be sure to align the oil drain hole in the gasket with the hole in the valve body.

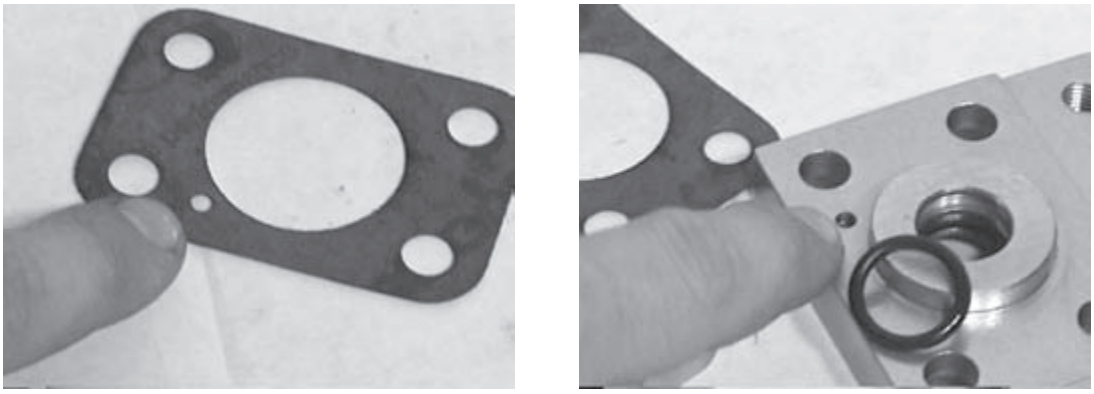


Figure 184. Holes in Gasket and Cover Must be Aligned

15. Install cover capscrews and torque to 23 N•m (17 lb•ft).

16. Install washer over stem and against oil seal.

17. Install spring over stem against washer.

18. Install lever onto the stem. It may be necessary to splay the lever to be able to install it. **DO NOT** apply any impact force to the lever, as the stem or dog-point setscrew may be damaged. Torque the lever's attaching screw to 9.5 N•m (7 lb•ft).

19. Install external retaining ring onto stem .

20. Install the steel balls and electrical switches into the bores in the sides of the valve body (if equipped). Note that the small diameter ball is inboard of the large diameter ball at each switch location.

21. Install the pressure regulating piston into valve body with spring pocket out.

22. Install pressure regulating springs into valve body and into piston spring pocket.

23. Install the shims that were removed into the bore of the rate-of-rise piston. Install the rate-of-rise piston over the springs and into valve body.

24. Install neutral pressure regulating spring into the pocket of valve body.

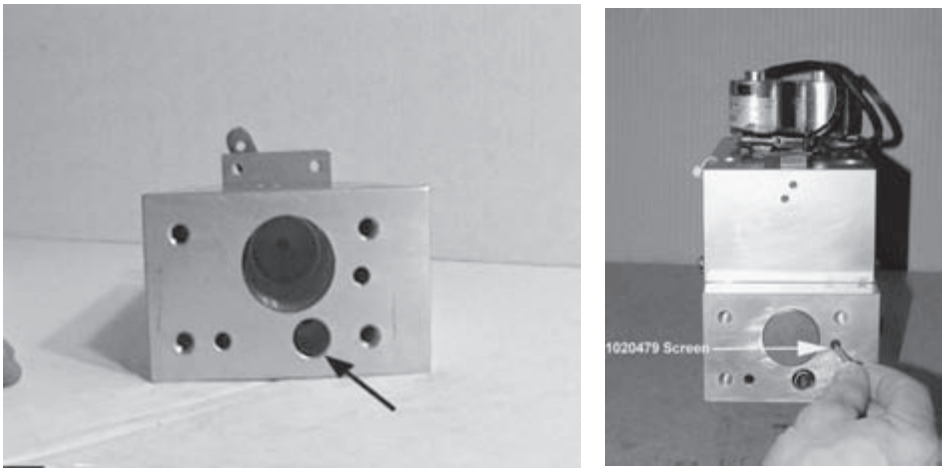


Figure 185. Neutral Pressure Regulating Spring Location

25. Install screen, if equipped, and install orifice plate gasket onto valve body.

26. Install orifice plate and steel ball (against spring) onto valve body.

27. Install orifice plate cover and gasket onto valve body. Install cover capscrews and torque to 23 N•m (17 lb•ft).

28. Install gasket over lower valve body half.

29. Set upper valve body half over lower valve body half. Insert the valve attaching screws through valve body halves to keep parts in alignment until installation onto the transmission. When installing the valve onto the transmission, torque the screws to 54 N•m (40 lb•ft.).

Assembly of Trolling Valve (optional equipment)

1. Press a new oil seal into the counterbore in the end of the adapter. Install a new O-ring into the groove of the adapter.

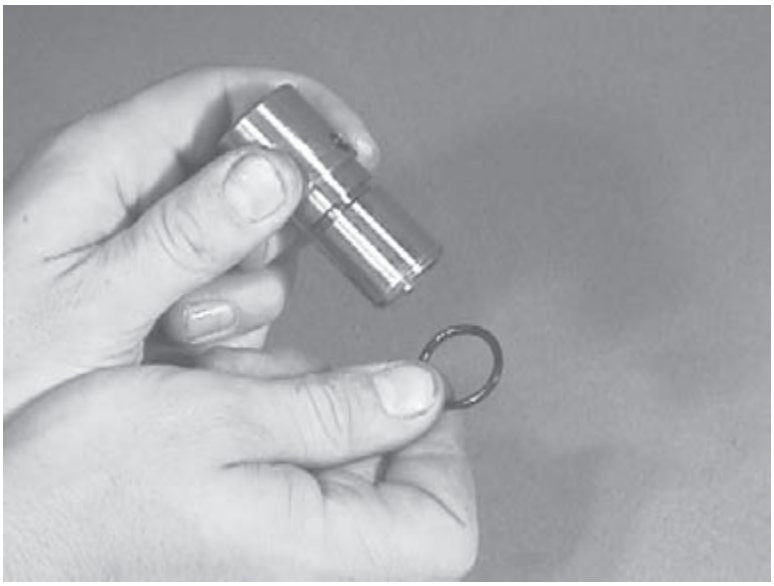


Figure 186. Installing O-ring onto Adapter

2. Install a new O-ring into the groove of the stem.

3. Install the roll pin into the end of the stem (if removed).

4. Install the inner spring onto the roll pin in the stem end with a counter-clockwise twisting motion. The spring should be installed onto the roll pin so that the first coil contacts the end of the stem.

5. Apply assembly grease to the stem from the O-ring to the reduced diameter end. Install the stem into the adapter, with the reduced diameter end entering the adapter first. Adjust the position of the stem if necessary to bring the helical slot into alignment with the dog-point setscrew hole.

6. Install the large diameter washer (used on some models) inside the bore of the adapter and over the inner spring until it lays flat on the end of the stem.

7. Install the small washer (used on some models) inside the piston. The washer must lie flat at the bottom of the bore in the piston.

8. Apply assembly grease to the adapter (where it contacts the trolling valve body) and install the adapter into the valve body. Be sure to align the setscrew holes in the adapter with those in the valve body.

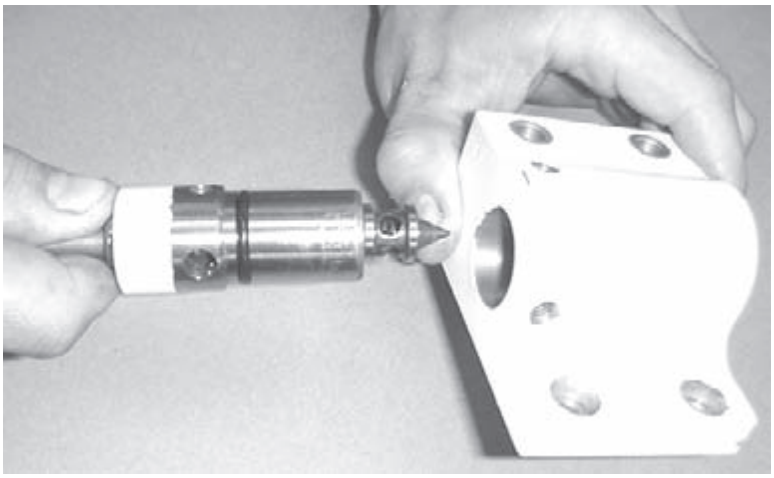


Figure 187. Installing Trolling Valve Parts Into Trolling Valve Body

9. Apply MA908 threadlocker to the threads of the dog-point setscrew and install. Tighten the dog-point setscrew until snug, then back off 1/2 turn. The end of the setscrew should protrude approximately 3 mm from the valve body when the dog point of the setscrew is fully engaged in the helical slot.

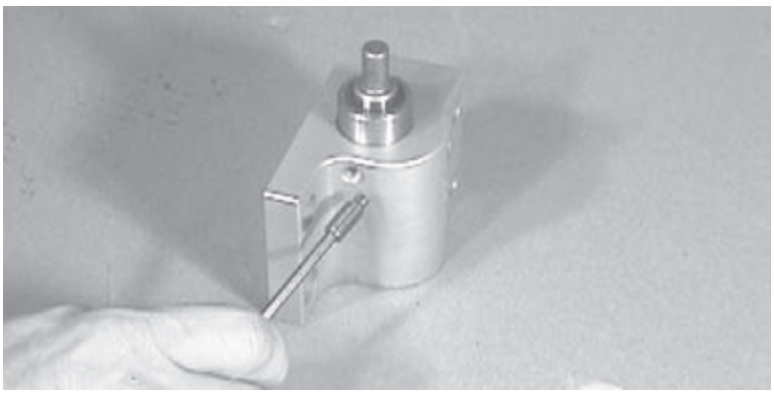


Figure 188. Installing Dog-point Setscrew

10. Check the action of the stem in the trolling valve. If the stem does not rotate 90° smoothly, loosen the dog-point setscrew 1/8 turn and recheck the action of the stem.

11. Install the detent ball and spring into the remaining hole in the valve body. Apply MA908 threadlocker to the threads of the detent setscrew and install until flush with the valve body.

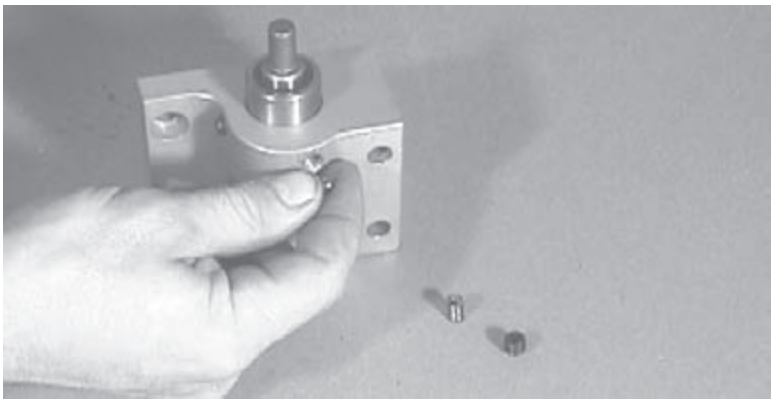


Figure 189. Installing Detent Ball, Spring, and Setscrew

12. Check the torque required to overcome the detent. The torque should be 1.1-1.7 N•m (10-15 in•lb). Adjust the detent setscrew if necessary to achieve the proper torque to rotate the lever out of the detent position.

13. Install the lever onto the stem. It may be necessary to splay the lever to be able to install it. **DO NOT** apply any impact force to the lever, as the stem or dog-point setscrew might get damaged.

14. Rotate the lever (if necessary) on the stem to the position shown on the valve installation drawing (see Engineering Drawing Section of this manual). Install the screw and nut to clamp the lever to the stem. Tighten the screw and nut to 9.5 N•m (7 ft•lb).

15. Install the neutral pressure regulating spring into the bore of the control valve (if removed).

16. Install the screen into the pocket. Install the steel ball onto the neutral pressure regulating spring.

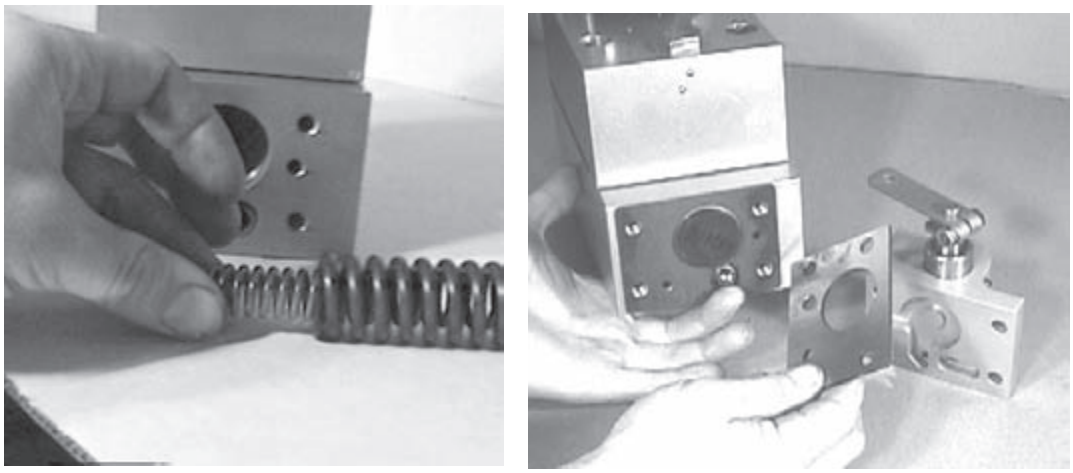


Figure 190. Installing Neutral Pressure Regulating Spring and Ball

17. Install the orifice plate gasket, orifice plate, trolling valve gasket, and trolling valve onto the control valve. Install the attaching screws and torque them to 23 N•m (17 ft•lb).

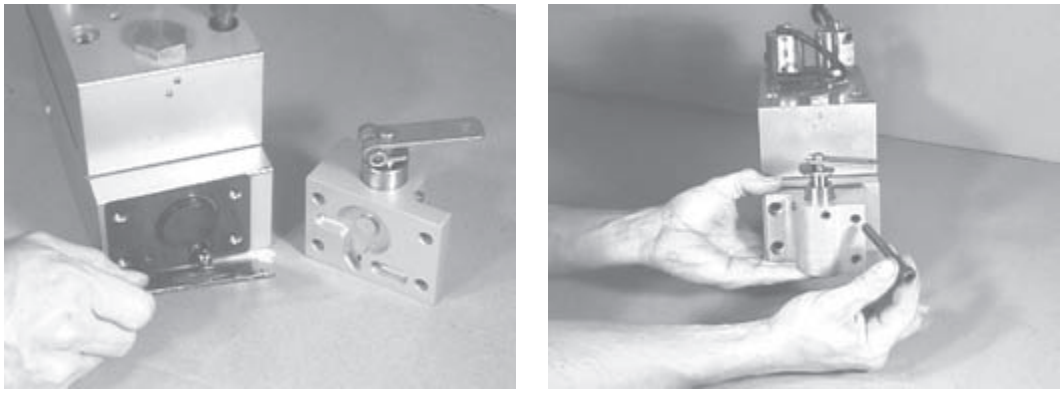


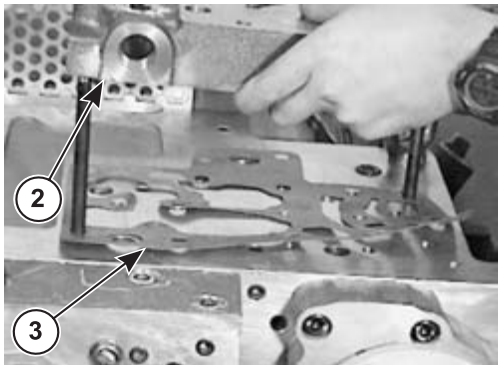
Figure 191. Installing Orifice Plate (left) and Trolling Valve Onto Valve Body (right)

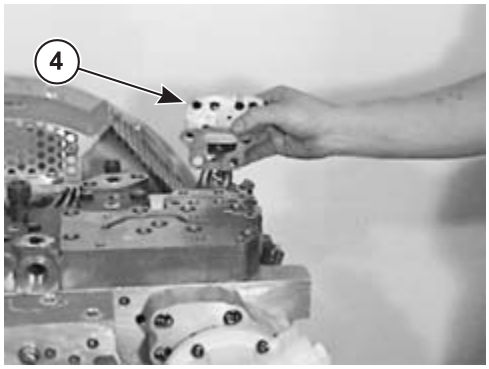
Ditch Plate Installation

1. Install the control valve ditch plate (2) and gasket (3) on top of the transmission housing. Tighten the screws to 46 N•m (34 lb•ft).

2. Install the forward cover (4) and gasket on top of the ditch plate. Tighten the screws to 46 N•m (34 lb•ft).

3. Install the selector valve and gasket. Tighten the screws to 46 N•m (34 lb•ft).





AAR322-6557 AAR323-6557

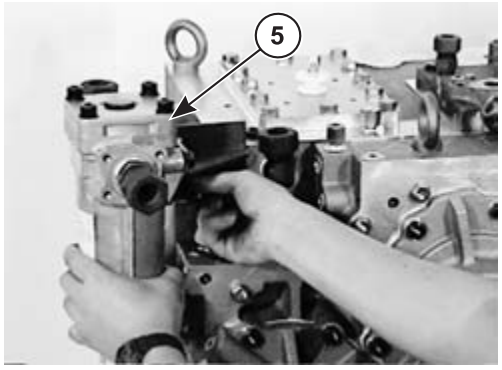
Figure 192. Ditch Plate (2), Gasket (3), and Forward Cover (4) Installation

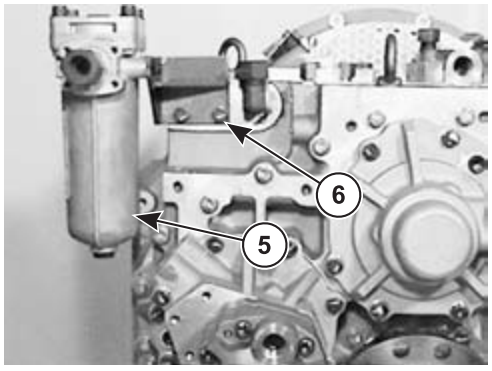
Oil Filter Housing Installation

1. Install the oil filter assembly (5). Torque the screws (6) to 46 N•m (34 lb•ft).

2. Install the piping assemblies on the transmission.
   a. Pump to filter.
   b. Filter to transmission housing.
   c. Ditch plate to valve (no trolling valve installed). Install hose if equipped with trolling valve.

   Note: See specification section for tubing and banjo fitting torque values.





AAR016-6557 AAR330-6557

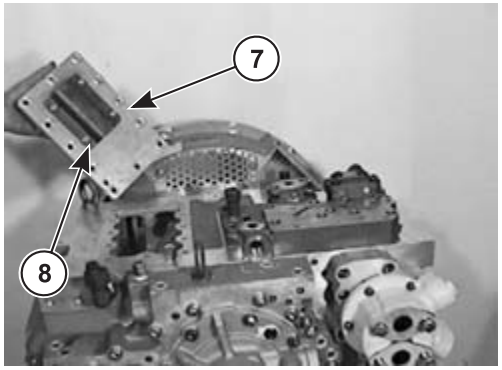
Figure 193. Oil Filter (5) Installation

Transmission Top Cover and Dip Stick Installation

1. The top cover (7) of the transmission housing should be installed with the oil baffle (8) towards the rear of the transmission housing.

   Note: The oil baffle attaching studs are sealed with Loctite® Threadlocker 277 or equivalent. The oil baffle retaining nuts are retained with Locktite® 242 or equivalent.

2. Place MA 1015 on the sealing surface (9) of the transmission housing and top cover.

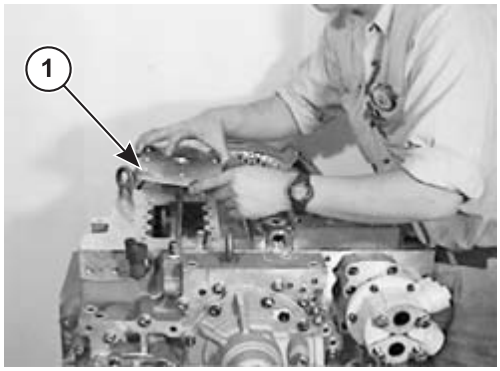


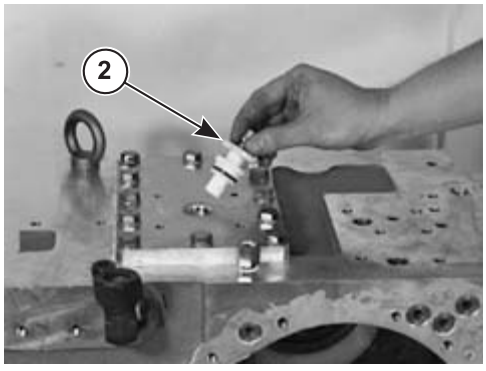
AAR324-6557 AAR326-6557

Figure 194. Seal Top Cover (7)

3. Install the top cover (1) on the transmission housing. Tighten the screws to 45 N•m (33 lb•ft).

4. Lubricate the sealing ring of the oil filler cap (2) and install it in the top cover of the transmission.

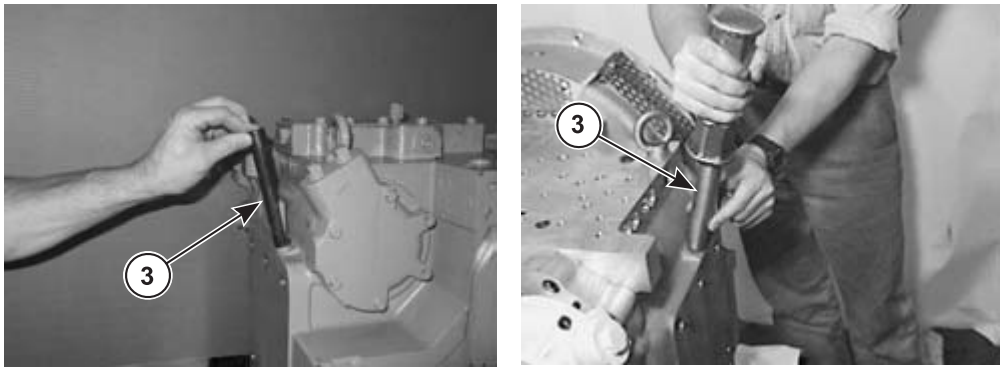




AAR327-6557 AAR164-6557

Figure 195. Install Top Cover (1) and Filler Cap (2)

5. Install the oil level gauge tube into the housing (if removed). Place tool T-21578-2 (3) over the top of the oil level gauge tube and gently tap the oil level gauge tube into the transmission housing.



AR6557-1038BE AAR316-6557

Figure 196. Using Tool T-21578-2 to Install Oil Level Gauge Tube

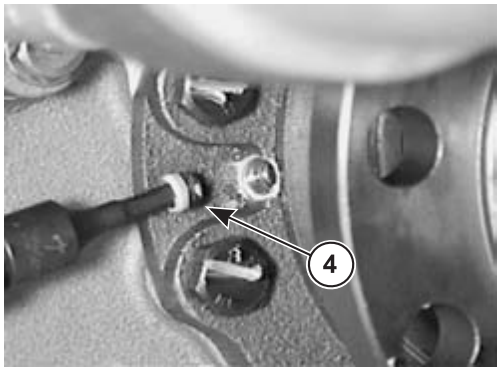
Grease Output Shaft Seals

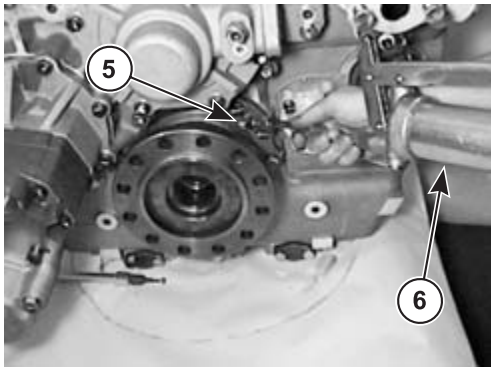
Fill the cavity between the two (single lip and double lip) output shaft seals with grease as follows.

a. Remove the pipe plug (4) on the output shaft seal retainer housing. The pipe plug is located on the opposite side (180° opposed) of the grease fitting (5) on the housing. The pipe plug provides a place for air to escape while greasing the seal cavity.

b. Use a grease gun (6) to fill the cavity with grease. When grease escapes the seal retainer through the pipe plug opening, the cavity is filled.

c. Reinstall the pipe plug.





AAR328-6557 AAR329-6557

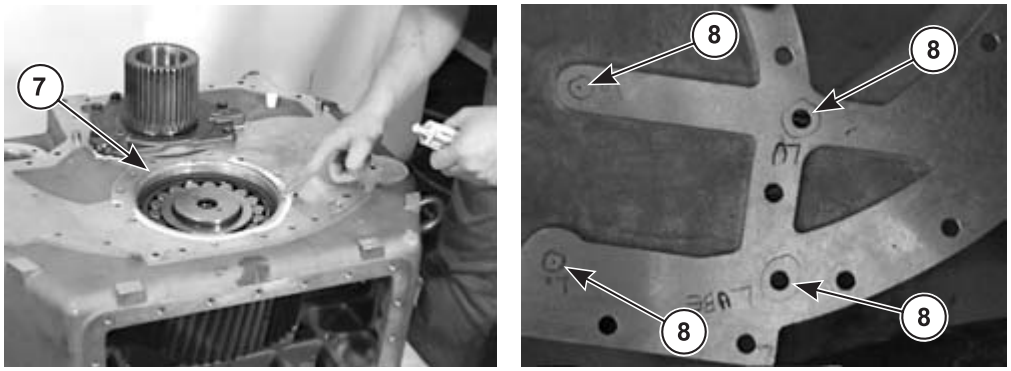
Figure 197. Grease Output Shaft Seals

Front Housing Installation

1. Apply MA1015 on the front of the transmission housing completely around the output shaft opening (7).

⚠ CAUTION

DO NOT block lube ports (8) located in the front housing with silicone sealer.

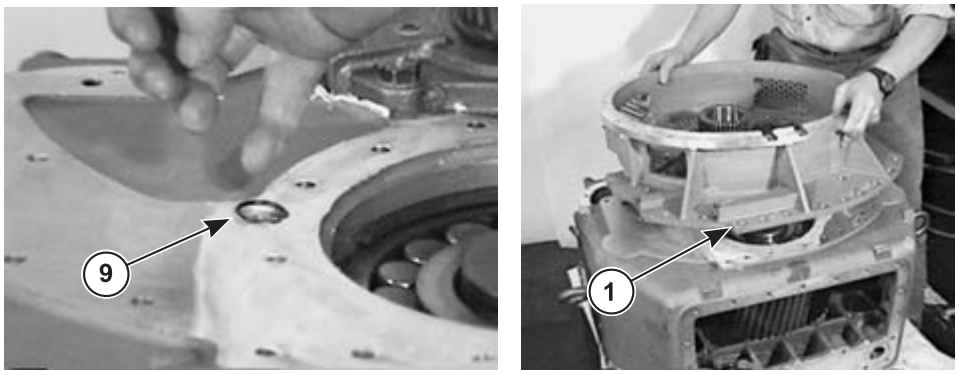


AAR257A-6557 AAR256-6557

Figure 198. Seal Transmission Housing Around Output Shaft Opening (7)

2. Install an O-ring in the transmission housing counterbore (9).

3. Install the transmission front housing (1) onto the transmission housing. The front housing is located on the transmission housing with two dowel pins. Drive the front housing near the dowel pins if necessary. Torque the screws to 46 N•m (34 lb•ft).



AAR258-6557 AAR259-6557

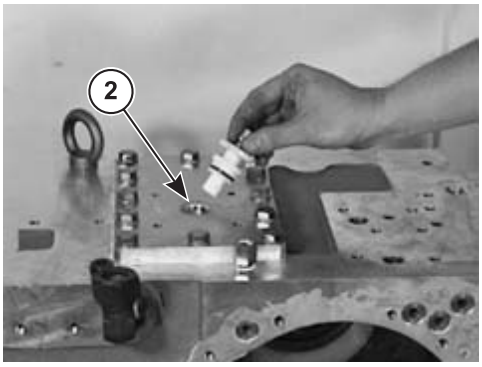
Figure 199. Install O-rings (9) in Transmission Housing Counter Bores and Transmission Front Housing

Install Torsional Coupling and Fill Transmission with Oil

1. Install the torsional coupling on the input drive hub.

⚠ IMPORTANT

Liquid sealant must cure for a minimum of 24 hours prior to contact with oil.



AAR164R-

Figure 200. Fill Transmission with Oil (2)

2. Fill the transmission with oil (2) before operation.

NOTES

Installation

Prior to Installation

⚠ CAUTION

Most Twin Disc products mount directly onto the flywheel of the engine, or are attached to the flywheel through external shafting or adapters. Flywheel-to-driven component interference is possible due to mismatch of components or other reasons. Therefore, engine crankshaft endplay as well as flywheel alignment checks must be made before the driven component is installed.

After installation of the driven component, the crankshaft endplay should be measured again. The endplay at the second measurement should be the same as the first. A difference in these two endplay measurements could be an indication of interference. Consequently, the driven component should be removed and the source of interference found and corrected.

Twin Disc will not be responsible for system damage caused by engine to Twin Disc component interference regardless of the cause of interference. This engine crankshaft endplay check is considered mandatory.

The transmission housing flange and pilot, the engine flywheel and the flywheel housing must be checked for trueness. Clean the engine flywheel and flywheel housing mounting surfaces thoroughly before any measurements are made.

Note: To isolate engine vibration and prevent transferring it to the hull through the propeller shaft, the distance from the marine gear output flange to a fixed stuffing box or the first fixed bearing must be a minimum of 20 times the shaft diameter. If the distance is less than this, a flexible coupling may be necessary to isolate the engine vibration.

Alignment (also reference SAE J-1033 and J-617)

1. Bolt a thousandths increment dial indicator or gauge to the engine flywheel so that the indicator is perpendicular to the face of the engine flywheel housing, and the indicator stem is riding on the face of the flange.

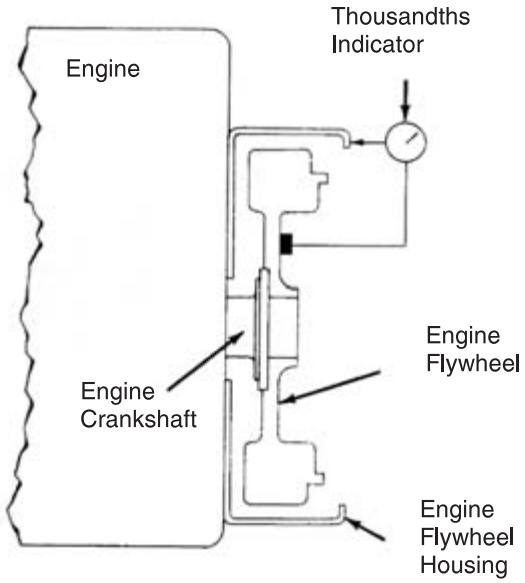


Figure 201. Checking Flywheel Housing Flange for Deviations

2. Rotate the engine flywheel, always keeping a thrust in the same direction, and note the face deviation of the engine flywheel-housing flange. The face deviation must not exceed the figures given in Table 12.

Table 12. Total Indicator Readings for Engine Flywheel Housing Flange

SAE Housing Number	Face Deviations and Bore Eccentricity mm (in)
00	0.48 (0.019)
0	0.41 (0.016)
1/2	0.36 (0.014)
1	0.30 (0.012)
2	0.28 (0.011)
3	0.25 (0.010)
4	0.23 (0.009)
5	0.20 (0.008)
6	0.18 (0.007)

3. With the indicator mounted as in the previous paragraph, adjust the indicator stem so that it will ride on the bore of the engine flywheel housing.

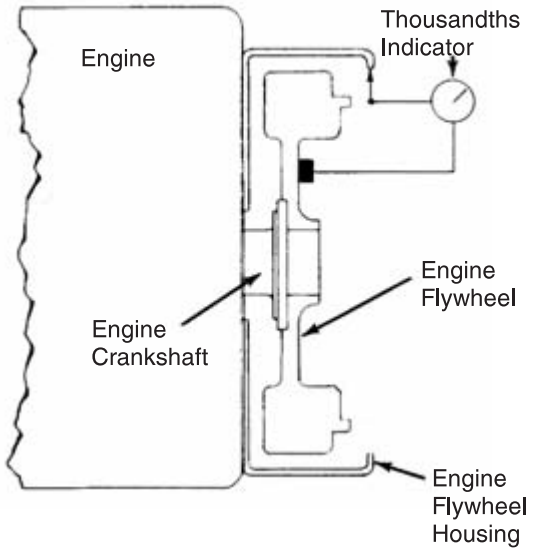


Figure 202. Checking Flywheel Housing Bore Eccentricity

4. Rotate the engine flywheel and note the bore eccentricity of the engine flywheel-housing bore. See Table 12 for allowable tolerances.

5. Bolt a thousandths dial indicator or gauge to the engine flywheel housing so that the indicator is perpendicular to the engine flywheel, and the indicator tip is riding on the inner face of the flywheel. Rotate the flywheel. The variation of the face runout of the surface to which the driving ring is bolted should not exceed 0.013 mm (0.0005 in.) per inch of diameter.

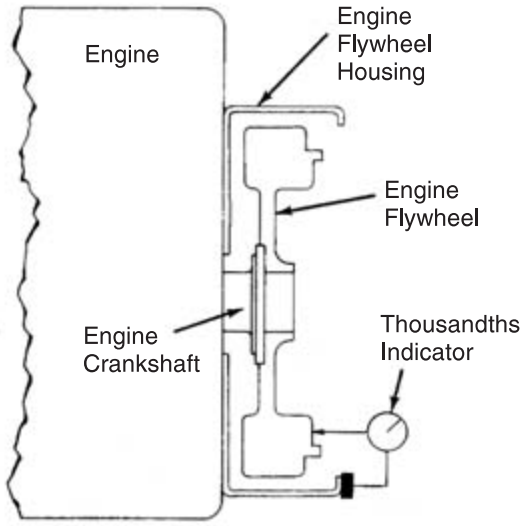


Figure 203. Checking the Flywheel Face Runout

6. With the indicator mounted as in the paragraph above, adjust the indicator tip so that it will ride on the driving ring pilot bore of the engine flywheel. Rotate the flywheel. The driving ring pilot bore eccentricity of the engine flywheel should not exceed 0.13 mm (0.005 in.) maximum total indicator reading. Thrust on the flywheel should be in one direction at all times to obtain a correct reading.

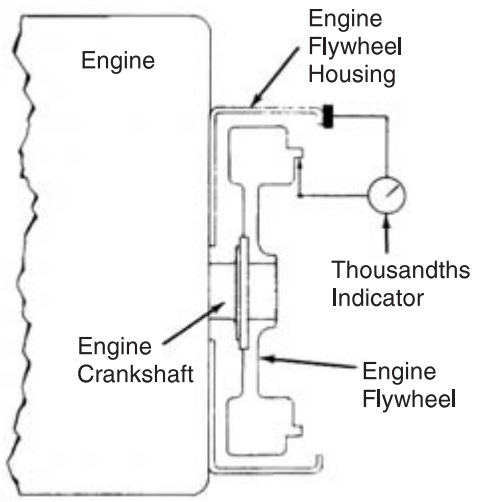


Figure 204. Checking the Flywheel Pilot Ring Bore Eccentricity

Installation

Alignment

Proper alignment of an engine and marine unit is critical, both during the initial installation and at frequent intervals during the life of the boat. It is common for a boat to change its form with various loads and with age. Engine and shaft alignment can also change on a boat due to varying loads and the boat's age. The following steps may be taken to secure proper marine transmission alignment.

When reinstalling a marine gear after a repair, or when installing a new marine gear to an engine already mounted in the bed rails, the flywheel housing should be checked for deflection using the following procedure:

1. Install the mounting brackets on the side mounting pads of the marine gear.
2. Install the driving ring on the engine flywheel. Bolt an indicator to the engine block and set the indicator stem on the engine flywheel housing.

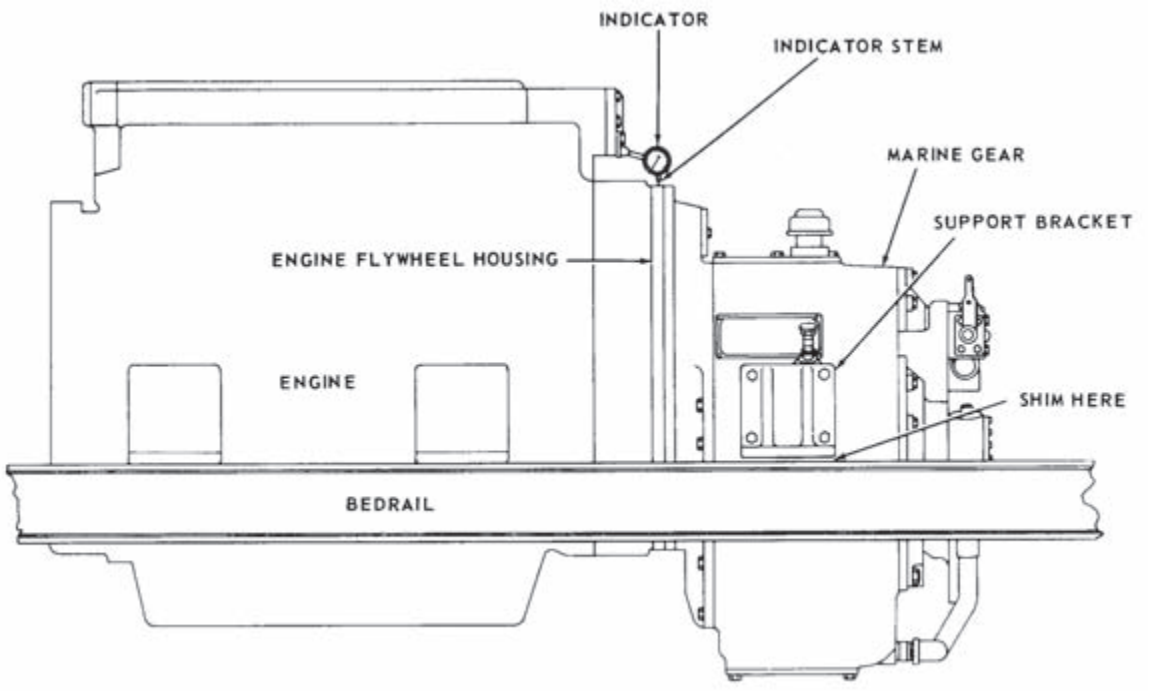


Figure 205. Marine Gear Alignment

3. Set the indicator gauge at zero (0).
4. Lift the marine gear with a hoist, or other suitable means, and place the unit in position against the engine flywheel housing.
5. Secure the flange of the marine gear main housing to the engine flywheel housing.
6. Use a feeler gauge between each mounting bracket and engine bed rail. Add shims between the brackets and bed rails to equal the feeler gauge readings.
7. Carefully release the lifting force on the marine gear while observing the indicator. The indicator gauge must remain steady at the zero mark.
8. Torque the bed bolts to the proper rating. If the reading moves from zero, lift the marine gear and insert additional shims. Continue this procedure until the marine gear is completely at rest on the bed rails and the gauge maintains a steady zero reading.
9. After obtaining the correct zero reading, indicating no distortion of the engine flywheel housing, secure the mounting brackets to the engine bed rails. Before securing the mounting brackets to the engine bed rails, the propeller shaft should be checked for alignment.

Note: The transmission output flange and companion flange bolts must be torqued to the proper value as identified in Description and Specifications.

Torsional Input Coupling Alignment - Free Standing Units

Alignment of freestanding transmissions must begin by aligning the transmission output flange to the propeller shaft. The engine must then be moved to properly align the engine flywheel to the transmission input hub.

Engine and Marine Transmission Alignment

⚠ CAUTION

When mounting the engine and transmission in the boat, all of the mounting pads on both the engine and transmission must be used. Failure to do so may result in damage to the transmission or the engine flywheel housing.

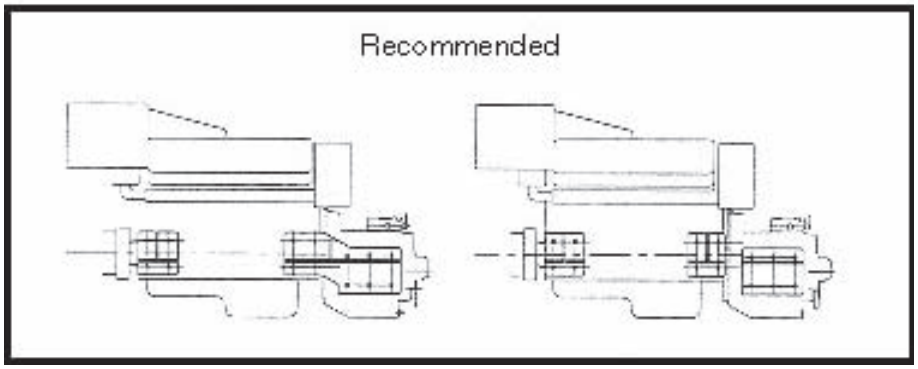


Figure 206. Recommended Transmission Mounting Configurations

When mounting the engine and transmission in the boat, all of the mounting pads on both the engine and the transmission must be used. Failure to do so may result in damage to the transmission.

It is important to align the engine and transmission only when the boat is afloat, and NOT in dry-dock. During this alignment period, it is also advisable to fill the fuel tanks and load the boat in the typical manner that it is to be used. Some boats are built with flexibility and may change shape as the loading varies.

When a heavy boat is dry-docked, it naturally undergoes some bending. Therefore, it is always good practice to unbolt the marine transmission coupling to prevent bending of the shaft.

With the engine and transmission in position on the engine bed, arrange to have a controlled lifting or lowering of each of the four corners of the engine. If threaded holes are provided in each of the engine mounts, jacking screws can be used in them. The engine can be raised by screwing down, or lowered by backing off on the jacking screws to obtain the desired adjustment.

Steel plates must be inserted under the jacking screws so that the bolts will not damage the engine bed. Lifting can also be accomplished by the use of chain hoists or properly placed jacks. Adjustable shims also are available and can simplify the alignment process, particularly for future realignment.

It may also be necessary to move the engine and transmission to one side or the other on the engine bed to obtain horizontal alignment. This can be done with a jack placed horizontally between the engine and the foundation. At the same time, a straight edge is laid across the edges of the flanges at the top and side to check the parallel alignment of the coupling edges.

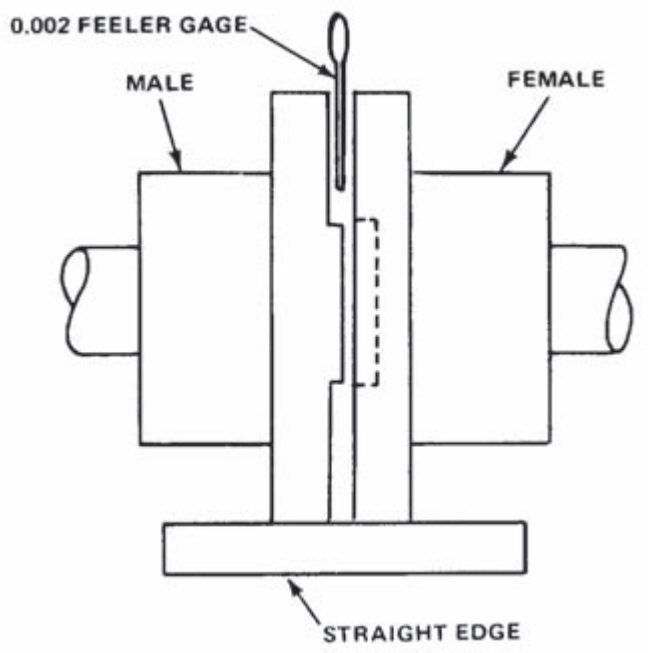


Figure 207. Checking Parallel Alignment of the Coupling

As the engine and marine transmission come into their aligned position, it will be possible to mate the output flange and propeller coupling, and prepare for bolting together. Care should be taken not to burr or mar this connection because the fit is very critical. Place a 0.05 mm (0.002 in.) feeler gauge between the flanges of the coupling. Move (slide) the feeler gauge completely around the coupling. Rotate the marine transmission flange coupling in 90 degree increments, and move the feeler gauge around the flange in each successive position. The feeler gauge will fit snugly, with the same tension, all around the flange coupling in all four positions if the alignment is correct.

If the alignment varies during rotation, additional alignment is necessary, or the marine transmission and shaft couplings should be checked for proper face runout. Runout must not exceed 0.10 mm (0.004 in.). Excessive face runout on the marine transmission output flange can usually be corrected by repositioning the coupling on its spline or taper. Excessive shaft coupling runout is usually due to inaccuracy of the taper fit or key to keyway interference. The optimum relative mating location will be where the measured runout dimensions of the transmission flange and the shaft coupling flange compliment each other to result in the least relative out of true parallel measurement.

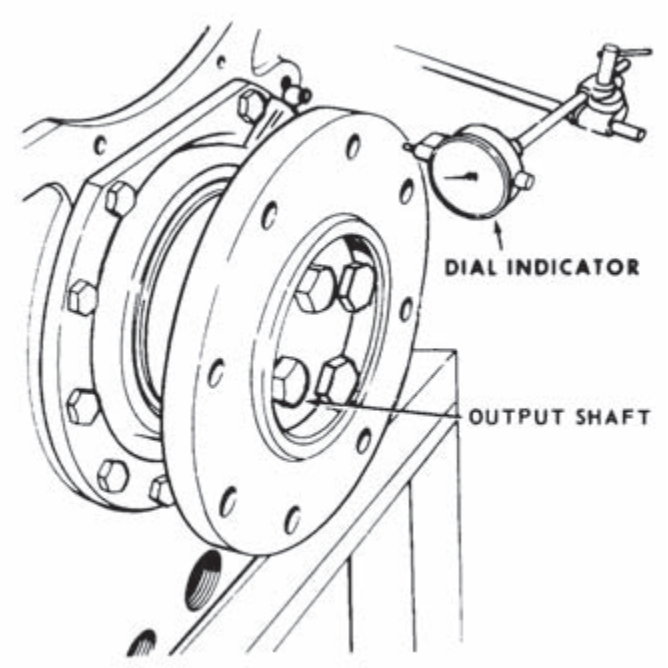


Figure 208. Checking Output Flange Face Runout

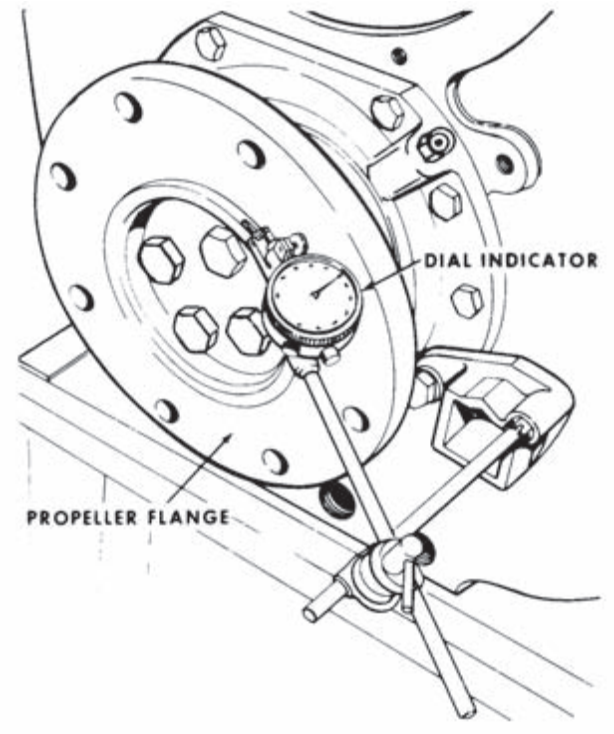


Figure 209. Checking Output Flange Pilot Eccentricity

Some boats are not structurally rigid and some carry their load in such a way that they will “hog” or go out of normal shape with every loading and unloading. Where this condition exists, it important to apply common sense alignment techniques to minimize the potential damage to any of the components.

During the process of securing final alignment, it may be necessary to shift the engine many times. When the final alignment is accomplished, mark and drill the holes for the lag studs or locating dowel pins. Then with final alignment secured, make up the necessary poured, steel, or hardwood shims, and fasten the engine and transmission in place. Then recheck the alignment, and if satisfactory, bolt the coupling together.

There are many types of flexible couplings in the market today that solve a variety of problems:

- ❑ Couplings to reduce noise and vibration.
- ❑ Couplings to allow a permanent angular misalignment.
- ❑ Couplings that allow engines to be flexibly mounted and take out the momentary misalignment.

In some cases, the proper alignment of these couplings requires an accuracy equal to that of rigid couplings. Always use the alignment procedures recommended by the coupling manufacturer.

Propeller Shaft

Before any attempt to align the engine and gearbox to the propeller shaft, proper alignment of the propeller shaft must be determined. This includes alignment of the propeller shaft through all struts and intermediate bearings. Failure to properly align the propeller shaft may result in premature wear on bearings, vibrations, or possible damage to other components.

If the length of the shaft from the last support bearing to the gearbox is excessive or a flexible stuffing box is used, the shaft must be centered prior to engine and gearbox to propeller shaft alignment.

Transmission Controls

⚠ CAUTION

Transmission controls must be checked for proper function and alignment after any transmission selector valve is properly indexed in relation to the operator's control lever. Failure to do so could cause control system malfunction, resulting in personal injury and/or damage to equipment and property.

See specific marine transmission installation drawings for detail and dimensional information needed for the proper installation of control linkages, power engaging devices, or electrical connections.

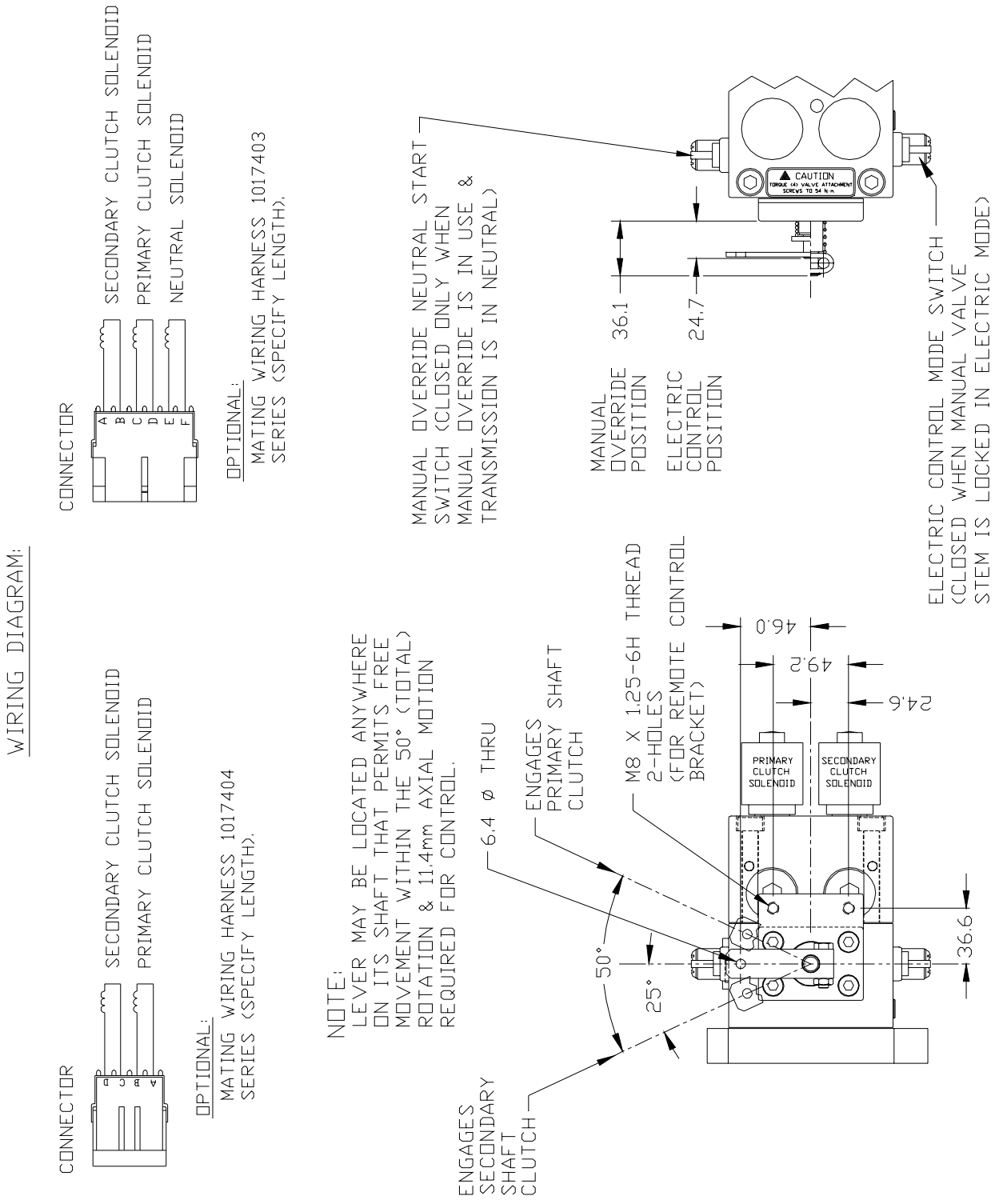


Figure 210. Electric Control Valve Installation Specifications

Mechanical Controls

If the manual override valve is connected to a control cable or device, movement of the operator's selector lever to the forward, neutral or reverse position must result in the transmission control valve selector being positioned in the forward, neutral or reverse detent location. Cables and linkages must be supported properly and not have any excessive slack that will allow relative movement between the operator's selector lever and the transmission control valve selector lever.

Power Controls

Selector valve positioning devices must be installed so that full travel of the actuating cylinder places the transmission selector valve in the detent position for forward or reverse, as selected, without exerting pressure on the rotational stop on the selector valve stem. Selecting Neutral must place the selector valve in the Neutral detent position. Improper installation of power engaging devices could cause failure of the selector valve stop permitting improper positioning of the selector valve and resulting in control malfunction.

Electrical Controls

All electrical wires and connectors must be adequately supported to prevent rubbing, chafing, or distress from relative movement. All electrical connections must be tight and free from any corrosion.

Final Checks

Be sure the transmission is filled with oil before starting. See Description and Specifications and Preventative Maintenance for proper oil and filling procedure.

Special Tools

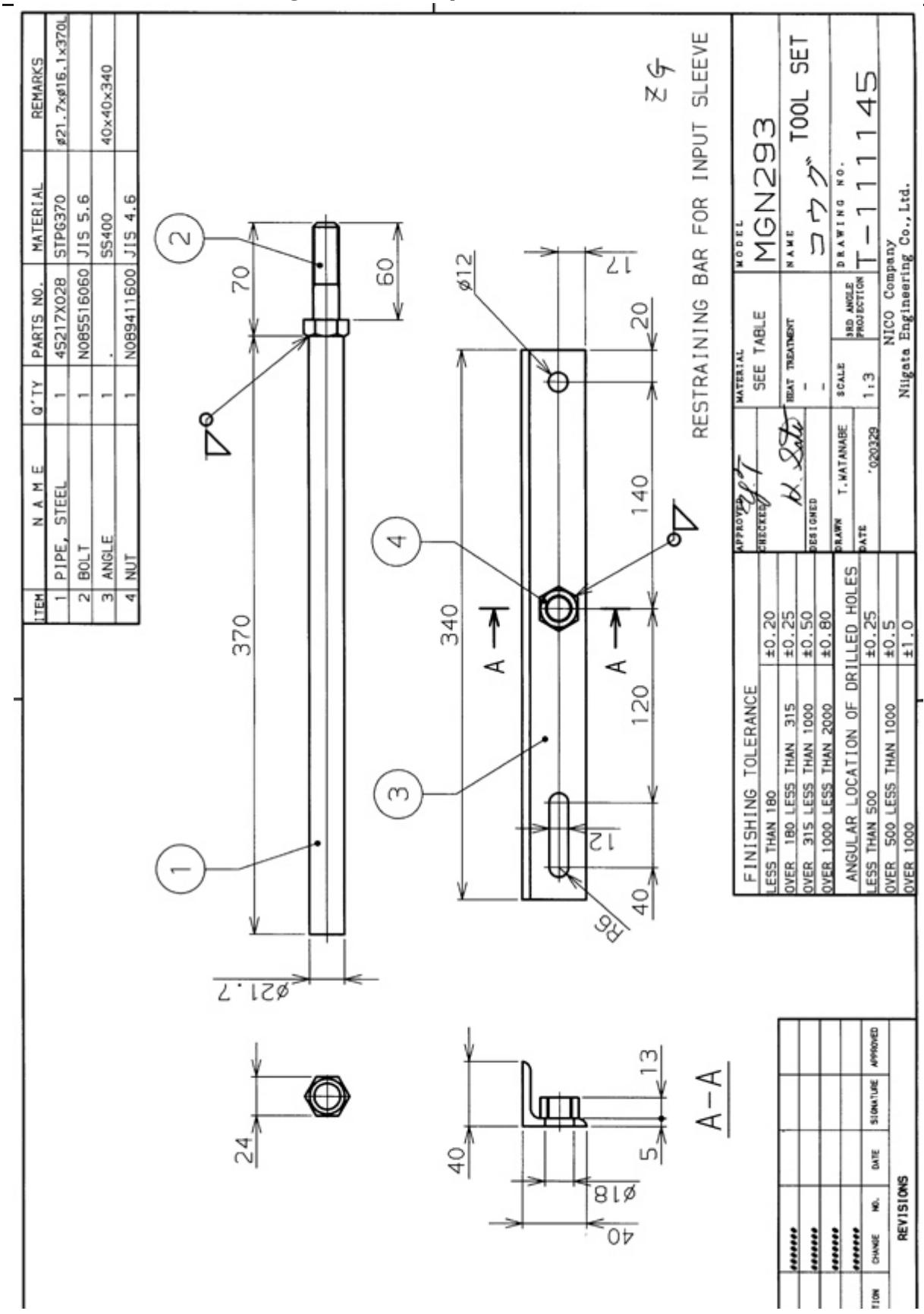
List of Special Tools

The following pages include the special tool drawings that are specific to this model. The special tool drawings included are listed below and continued on the following page.

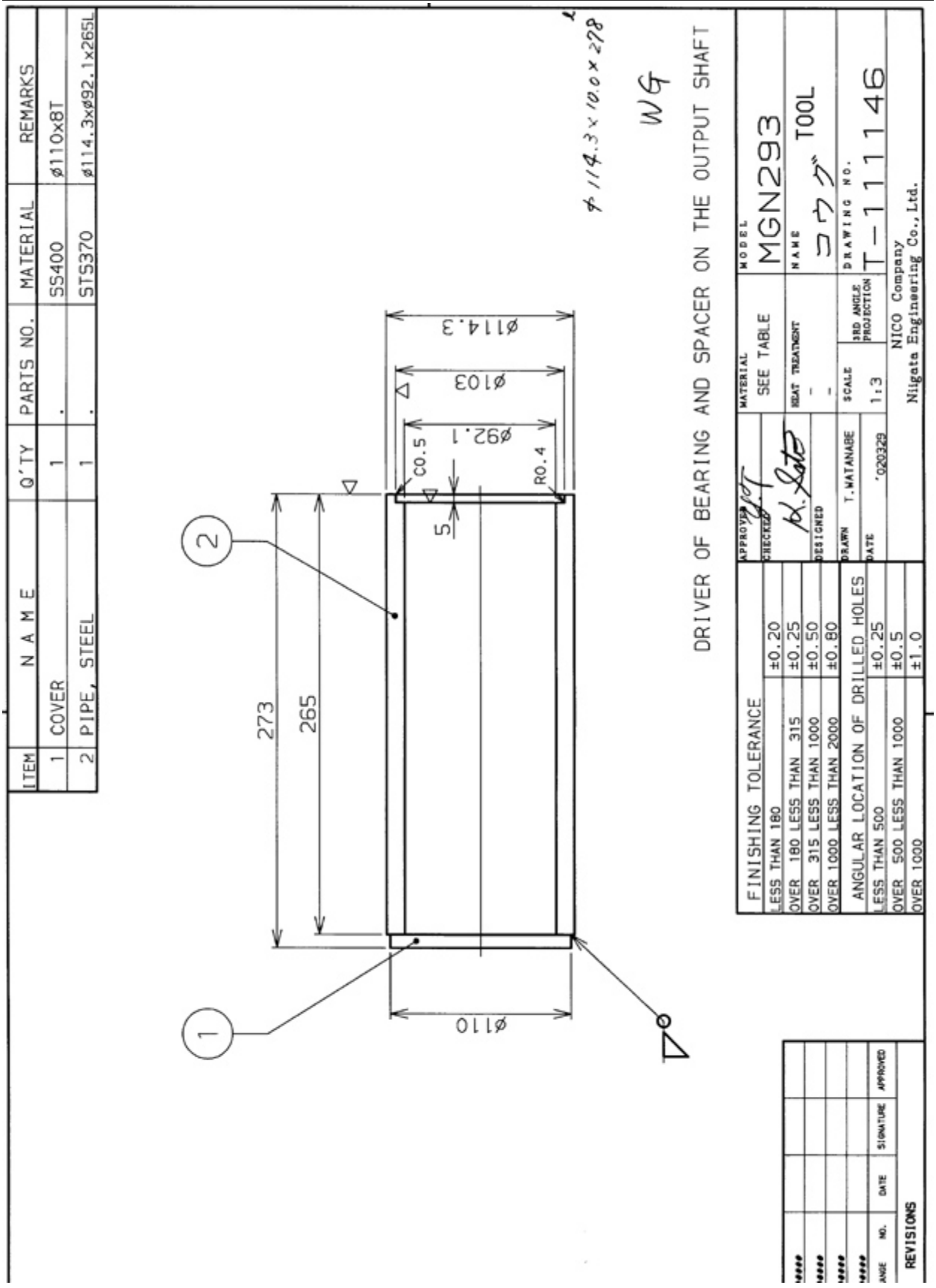
- ❑ T-111145 Restraining Bar for Input Sleeve
- ❑ T-111146 Driver, Output Shaft Bearing and Spacer
- ❑ T-21482-06 Retention Block and Screw
- ❑ T-21482-08 Hydraulic Knock-out Tool
- ❑ T-21482-13 Locating Plate
- ❑ T-21482-17 Trailing Pump Gear and Bearing Removal Tool
- ❑ T-21482-20 Bearing Driver
- ❑ T-21482-21 Restraining Tool, Output Shaft
- ❑ T-21482-22 Shaft Support Tool
- ❑ T-21482-23 Retainer, Input Drive Sleeve
- ❑ T-21482-26 Bearing Driver
- ❑ T-21482-30 Bearing Driver
- ❑ T-21482-36 Input Oil Seal Carrier Puller
- ❑ T-21482-39 Support Bracket (Leg)
- ❑ T-21482-53 Primary Clutch End Play Fixture
- ❑ T-21482-54 Secondary Clutch End Play Fixture

❑	T-21578-1	Output Flange Installing Fixture (Sheet 3 of 3)
❑	T-21578-4	Output Shaft Bearing Driver (Sheet 1 of 2)
❑	T-21482	Output Gear Installing Tool
❑	T-21482-02	Output Gear Ram
❑	T-21482-40	Pump Bearing Pulling Tool (Sheet 1 of 3)
❑	T-21482-40A	Clutch Spring Compressing Tool (Sheet 2 of 3)
❑	T-21482-40B	Input Hub Removal Tool (Sheet 3 of 3)
❑	T-21482-41	Seal Driver
❑	T-21482-42	Bearing Driver
❑	T-21482-43	Bearing Driver
❑	T-21482-44	Adjustable Jack
❑	T-21482-45	Bearing Driver
❑	T-21482-46	Seal Driver
❑	T-21482-47	Transfer Gear Installation Tool
❑	T-21482-49	Bearing Cone Driver
❑	T-21482-50	Clutch Alignment Tool
❑	T-21482-51	Primary Clutch Cover
❑	T-21482-52	Secondary Clutch Cover

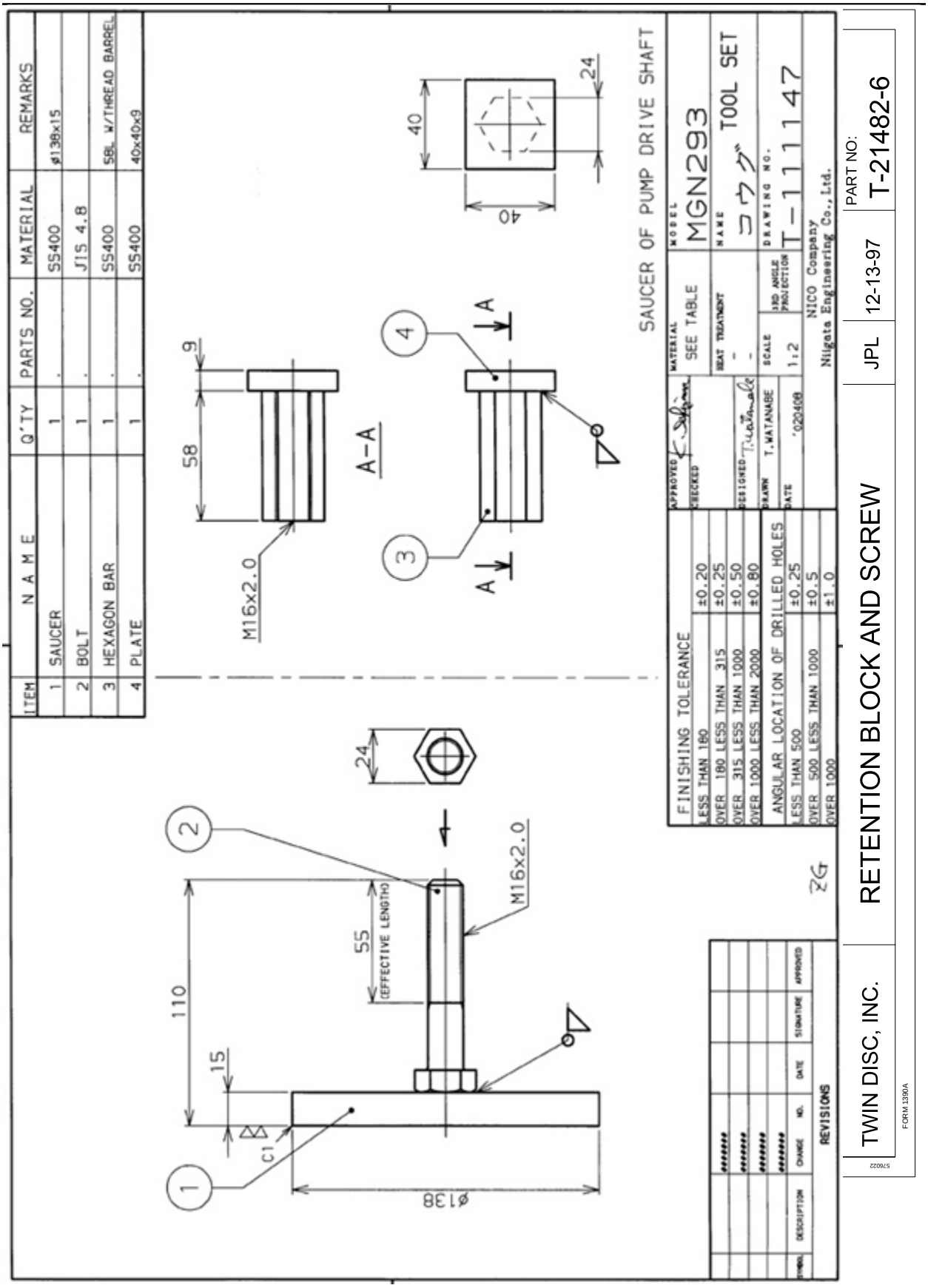
T-111145 Restraining Bar for Input Sleeve



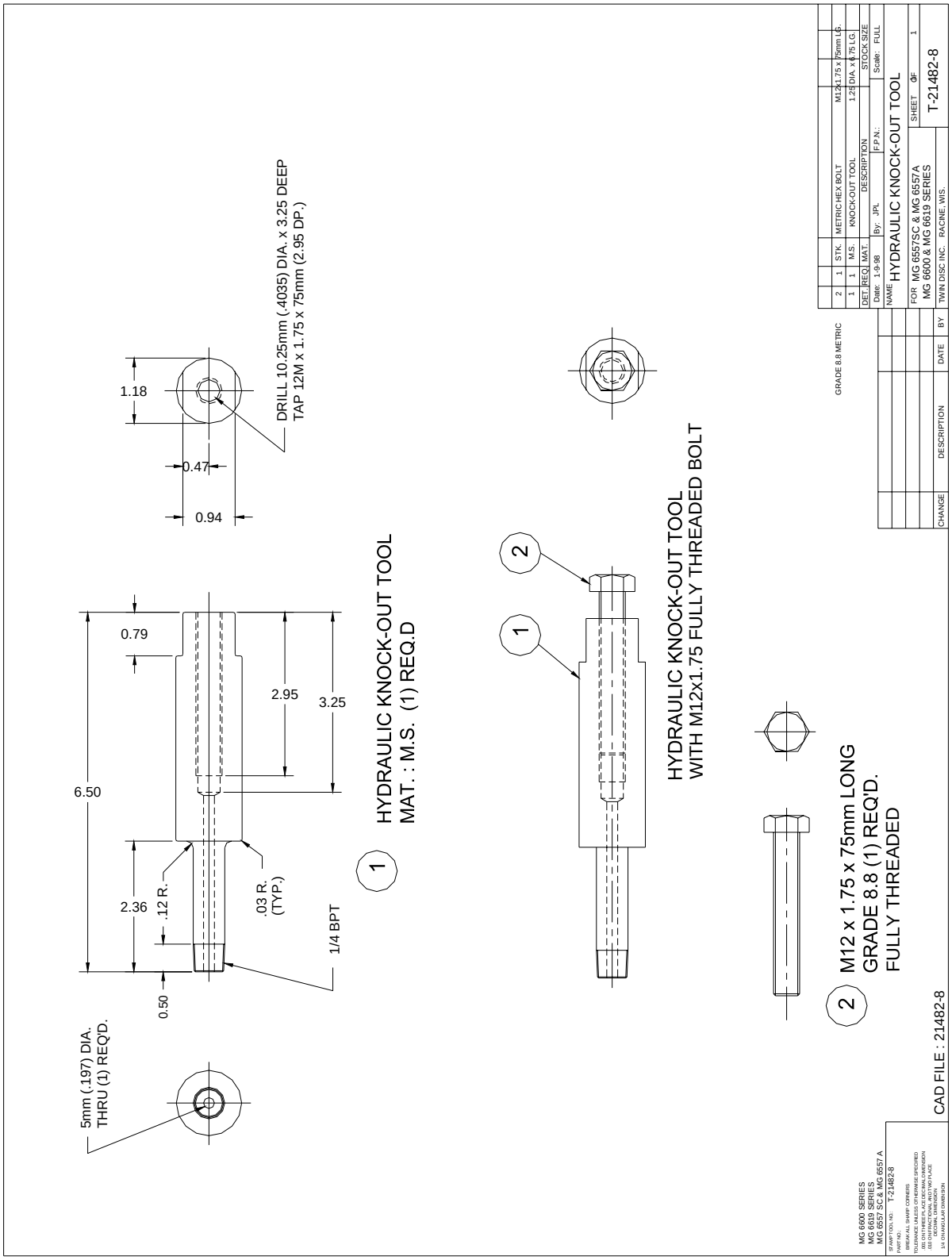
T-111146 Driver, Output Shaft Bearing and Spacer



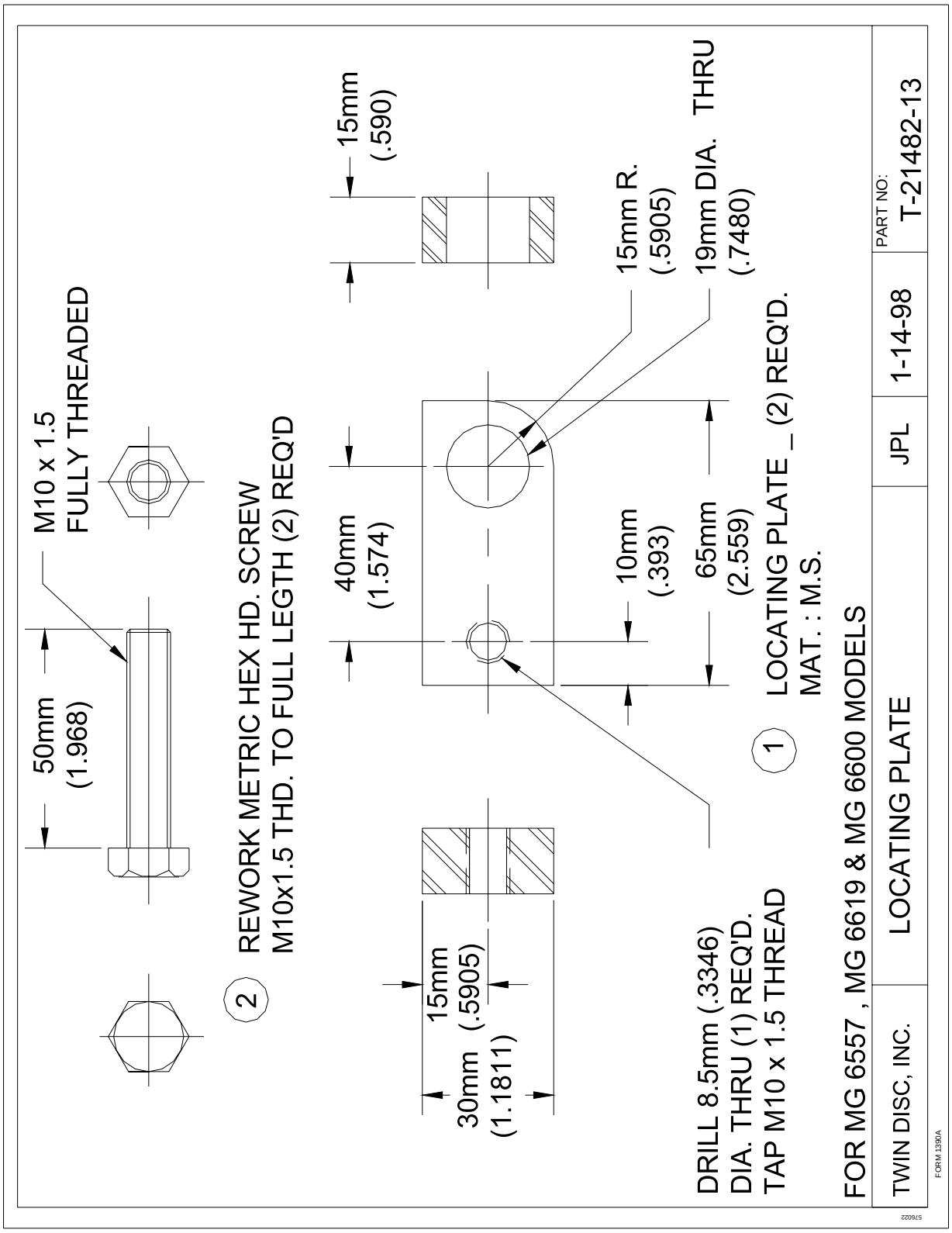
T-21482-06 Retention Block and Screw



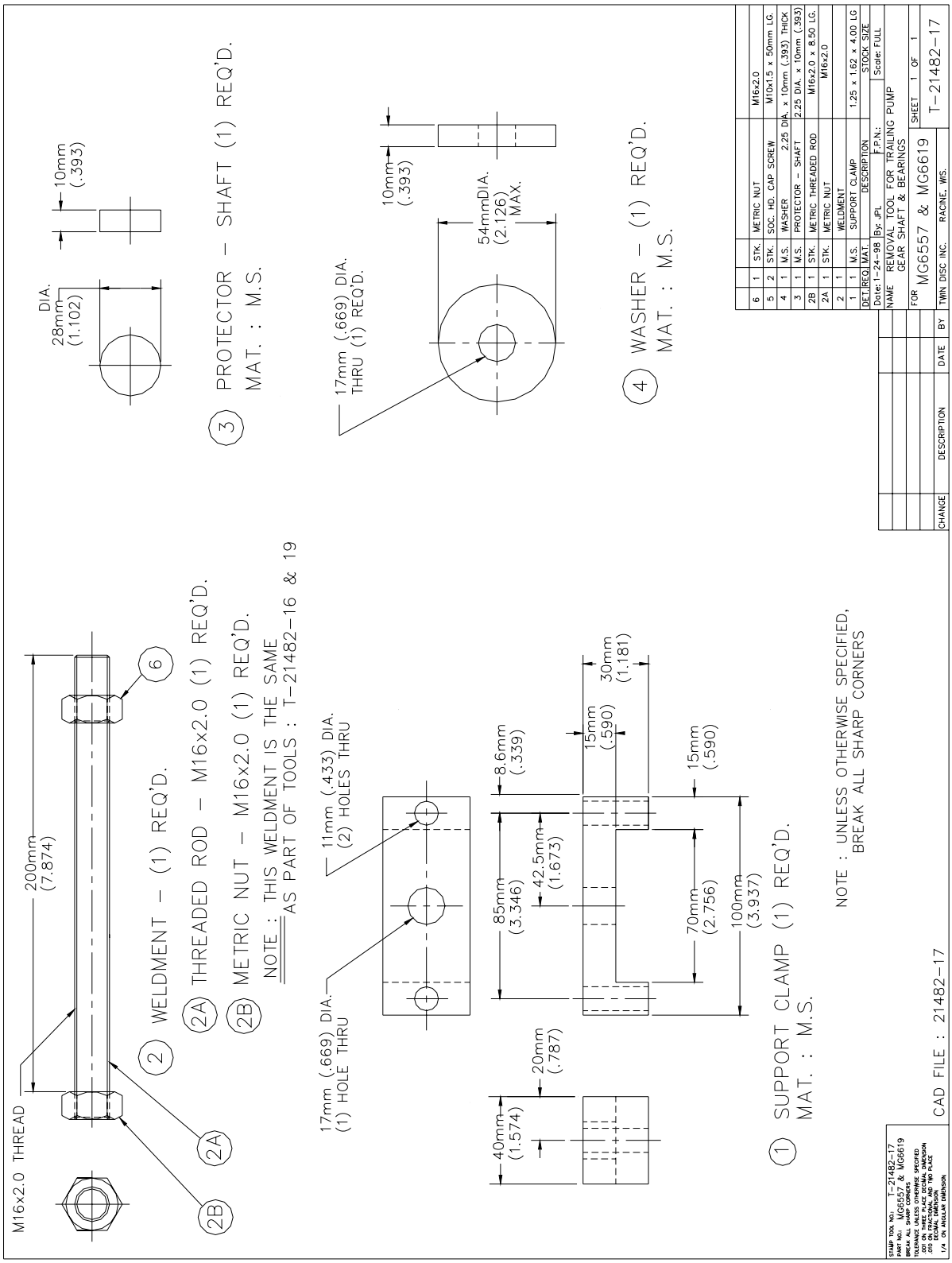
T-21482-08 Hydraulic Knock-out Tool



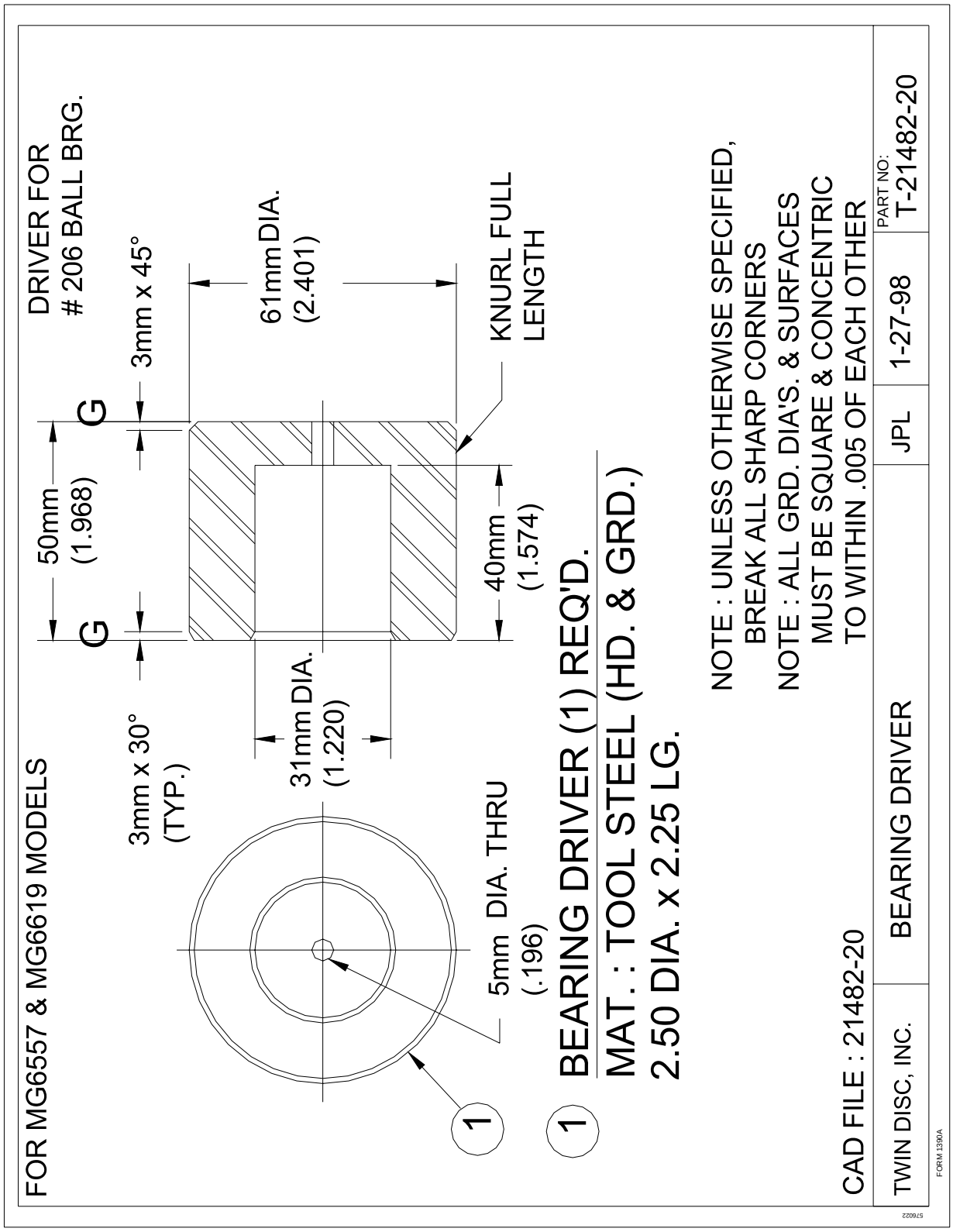
T-21482-13 Locating Plate



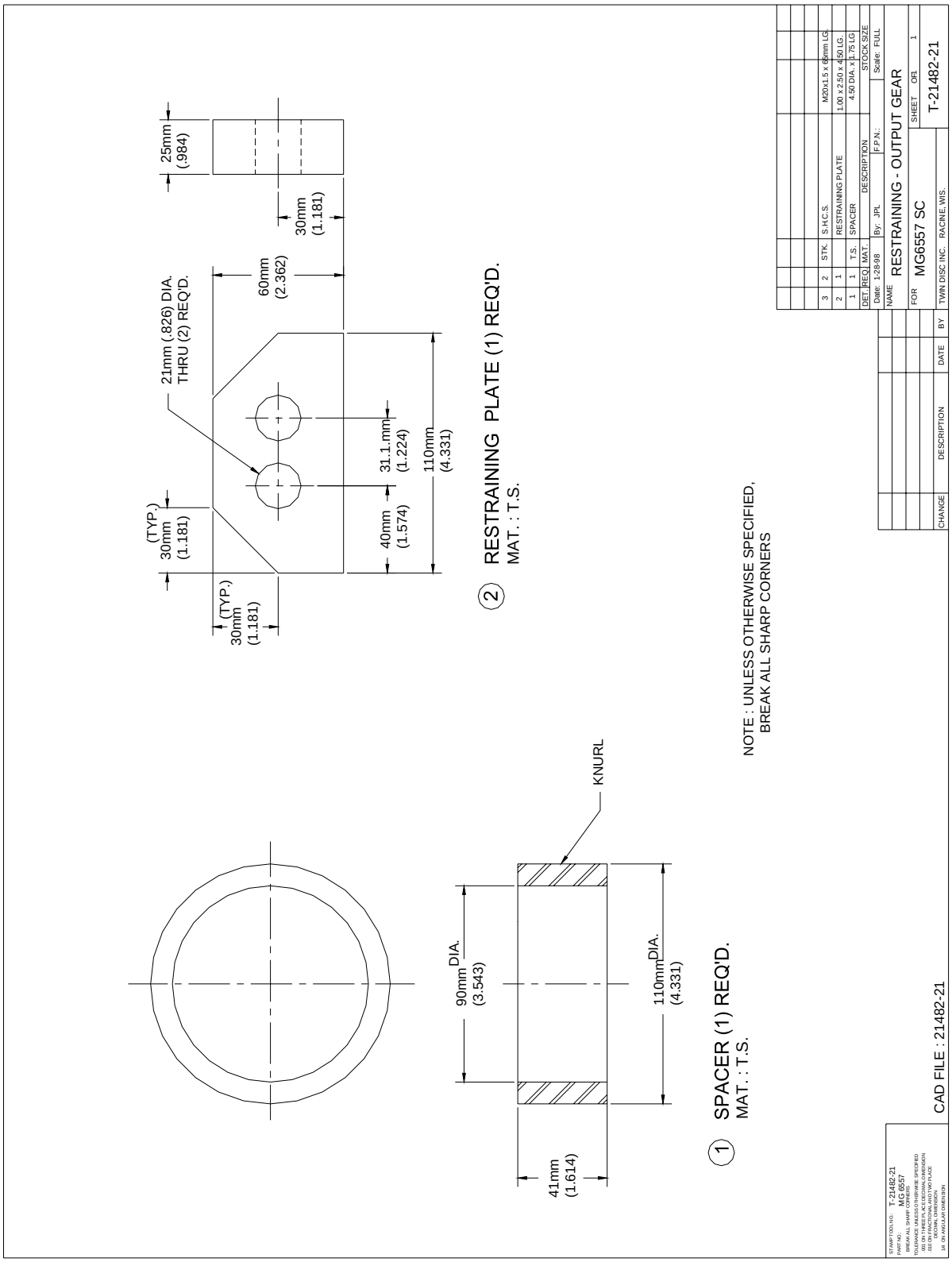
T-21482-17 Trailing Pump Gear and Bearing Removal Tool


M16x2.0 THREAD
200mm (7.874)
6
2 WELDMENT – (1) REQ'D.
2A THREADED ROD – M16x2.0 (1) REQ'D.
2B METRIC NUT – M16x2.0 (1) REQ'D.
NOTE : THIS WELDMENT IS THE SAME AS PART OF TOOLS : T-21482-16 & 19
2A
2B
17mm (.669) DIA. (1) HOLE THRU
11mm (.433) DIA. (2) HOLES THRU
8.6mm (.339)
85mm (3.346)
42.5mm (1.673)
15mm (.590)
30mm (1.181)
15mm (.590)
70mm (2.756)
100mm (3.937)
20mm (.787)
40mm (1.574)
1 SUPPORT CLAMP (1) REQ'D.
MAT. : M.S.
NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS
CAD FILE : 21482-17
DIA. 28mm (1.102)
10mm (.393)
3 PROTECTOR – SHAFT (1) REQ'D.
MAT. : M.S.
17mm (.669) DIA. THRU (1) REQ'D.
10mm (.393)
54mmDIA. (2.126) MAX.
4 WASHER – (1) REQ'D.
MAT. : M.S.
6 1 STK. METRIC NUT M16x2.0
5 2 STK. SOC. HD. CAP SCREW M10x1.5 x 50mm LG.
4 1 M.S. WASHER 2.25 DIA. x 10mm (.393) THICK
3 1 M.S. PROTECTOR – SHAFT 2.25 DIA. x 10mm (.393)
2B 1 STK. METRIC THREADED ROD M16x2.0 x 8.50 LG.
2A 1 STK. METRIC NUT M16x2.0
2 1 WELDMENT
1 1 M.S. SUPPORT CLAMP 1.25 x 1.62 x 4.00 LG
DET. REQ. MAT. DESCRIPTION STOCK SIZE
Date: 1-24-98 By: JPL F.P.N.: Scale: FULL
NAME REMOVAL TOOL FOR TRAILING PUMP GEAR SHAFT & BEARINGS
FOR MG6557 & MG6619
SHEET 1 OF 1
T-21482-17
TWIN DISC INC. RACINE, WIS.
CHANGE DESCRIPTION DATE BY
STAMP TOOL NO.: T-21482-17
PART NO.: MG6557 & MG6619
MATERIAL: SEE DRAWING
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

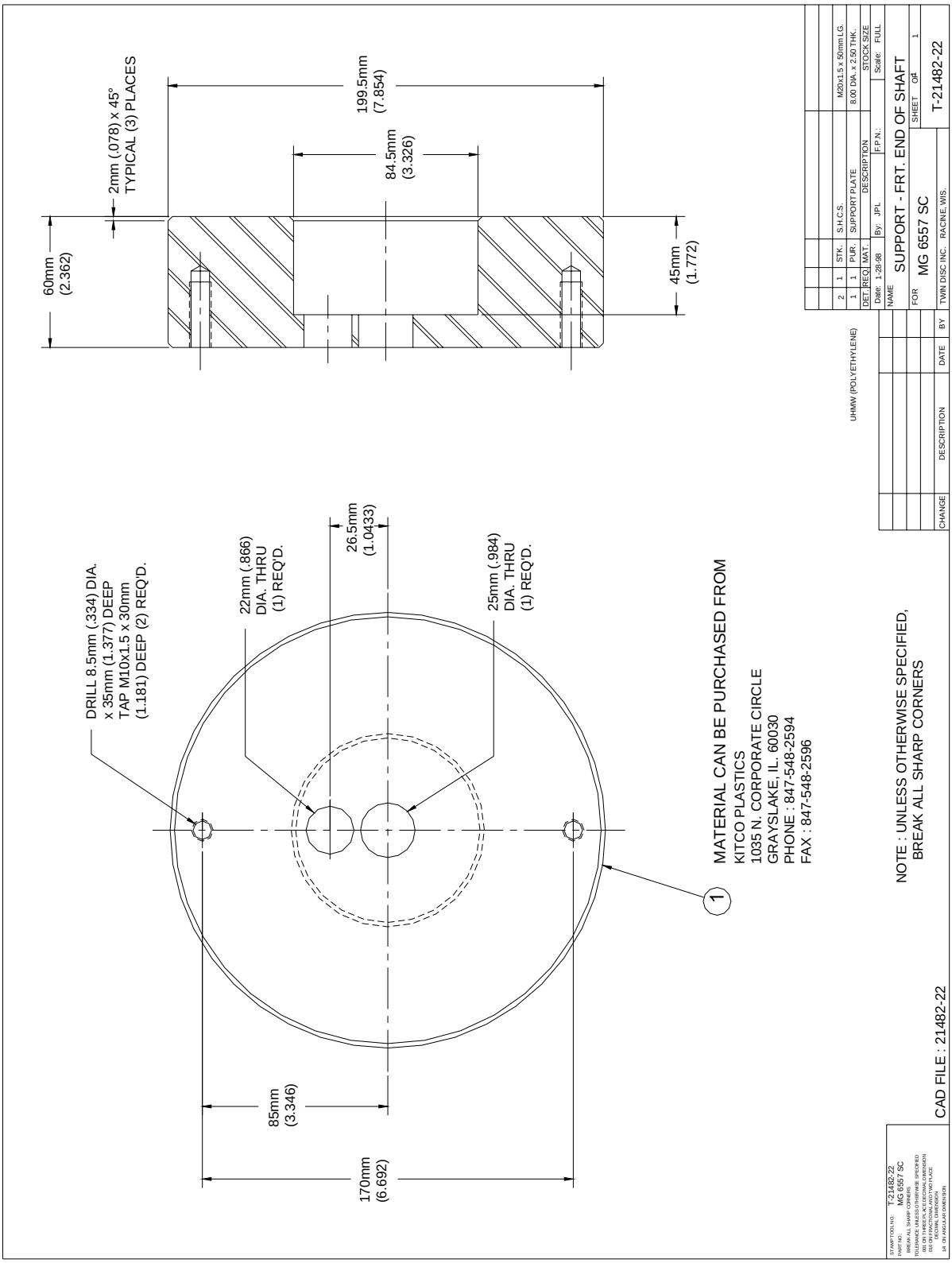
T-21482-20 Bearing Driver



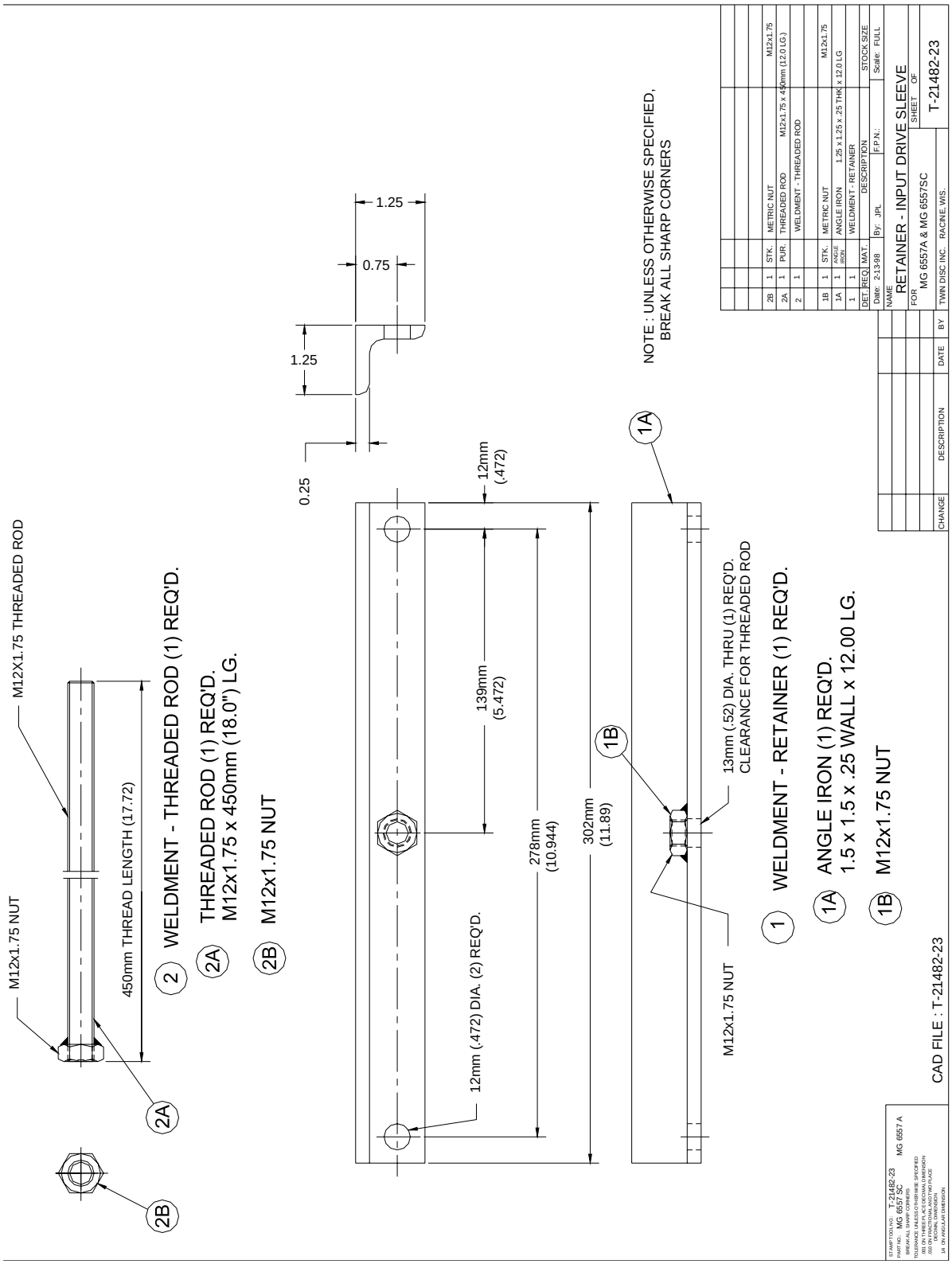
T-21482-21 Restraining Tool, Output Shaft


25mm (.984)
30mm (1.181)
60mm (2.362)
21mm (.826) DIA. THRU (2) REQ'D.
(TYP.) 30mm (1.181)
(TYP.) 30mm (1.181)
31.1mm (1.224)
110mm (4.331)
40mm (1.574)
2 RESTRAINING PLATE (1) REQ'D.
MAT. : T.S.
NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS
KNURL
90mm DIA. (3.543)
110mm DIA. (4.331)
41mm (1.614)
1 SPACER (1) REQ'D.
MAT. : T.S.
3 2 STK. S.H.C.S. M20x1.5 x 65mm LG.
2 1 RESTRAINING PLATE 1.00 x 2.50 x 4.50 LG.
1 1 T.S. SPACER 4.50 DIA. x 1.75 LG.
DET REQ MAT. DESCRIPTION STOCK SIZE
Date: 1-23-98 By: JPL F.P.N.: Scale: FULL
NAME RESTRAINING - OUTPUT GEAR
FOR MG6557 SC SHEET OR 1
TWIN DISC INC. RACINE, WIS. T-21482-21
CHANGE DESCRIPTION DATE BY
CAD FILE : 21482-21

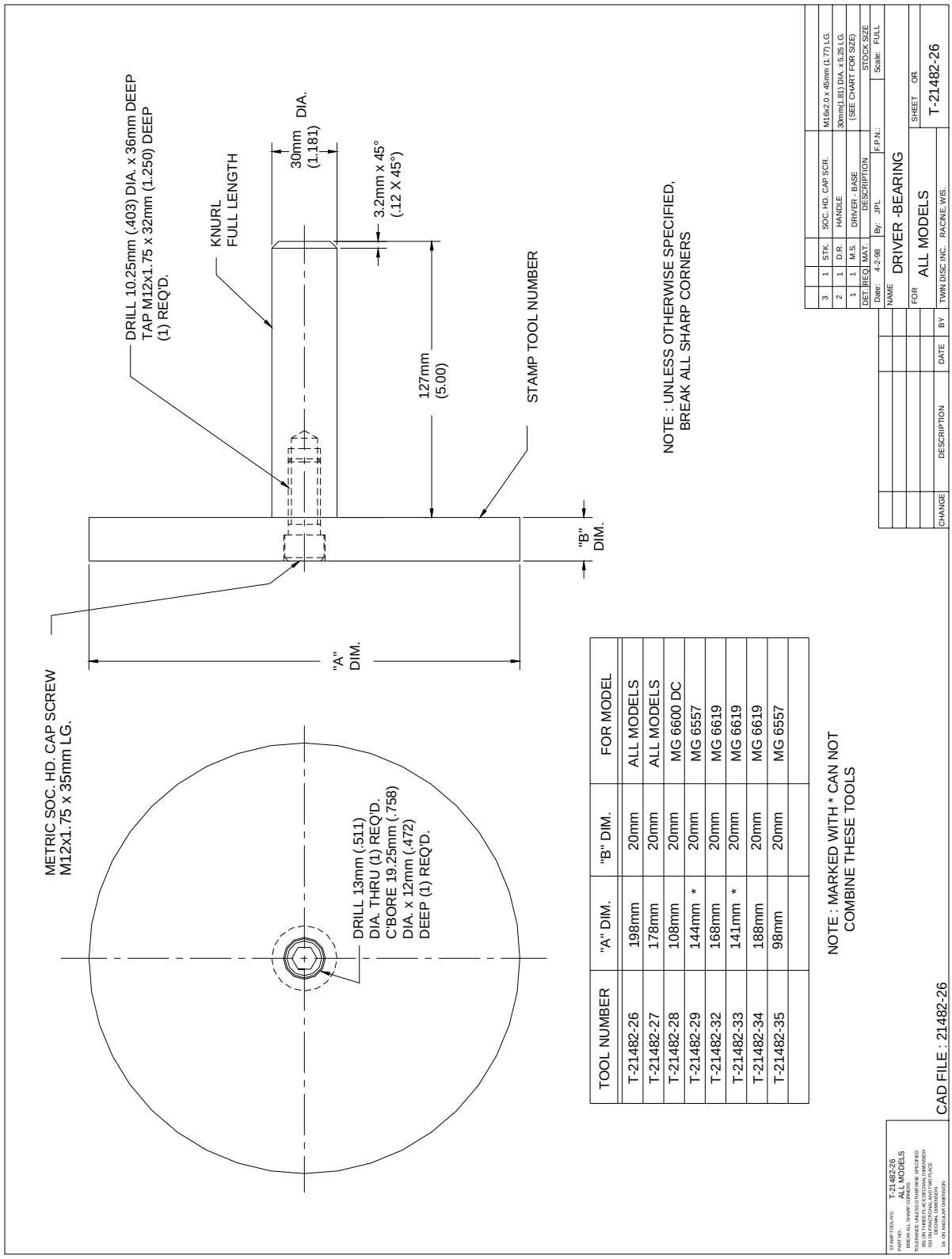
T-21482-22 Shaft Support Tool



T-21482-23 Retainer, Input Drive Sleeve

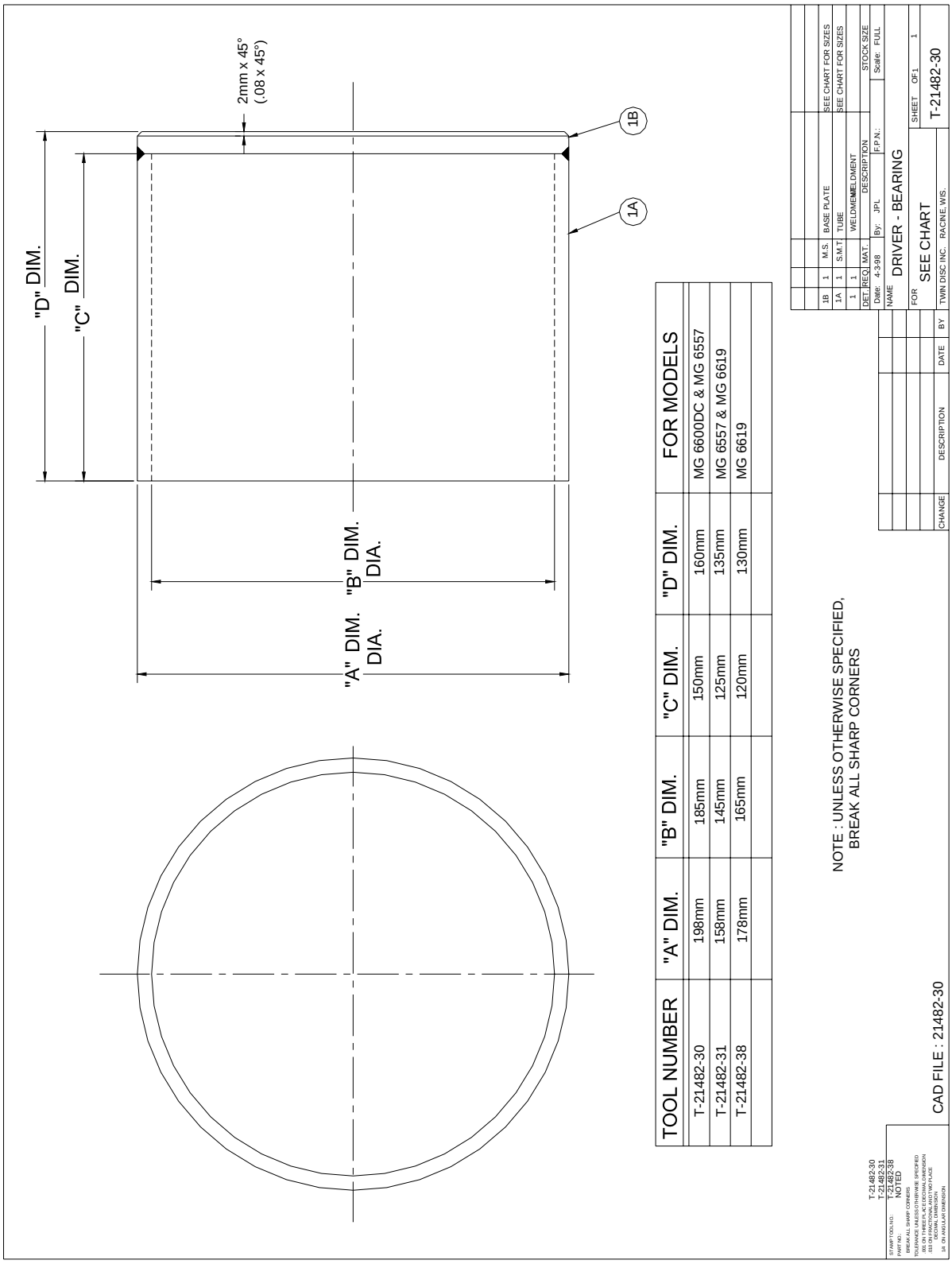


T-21482-26 Bearing Driver



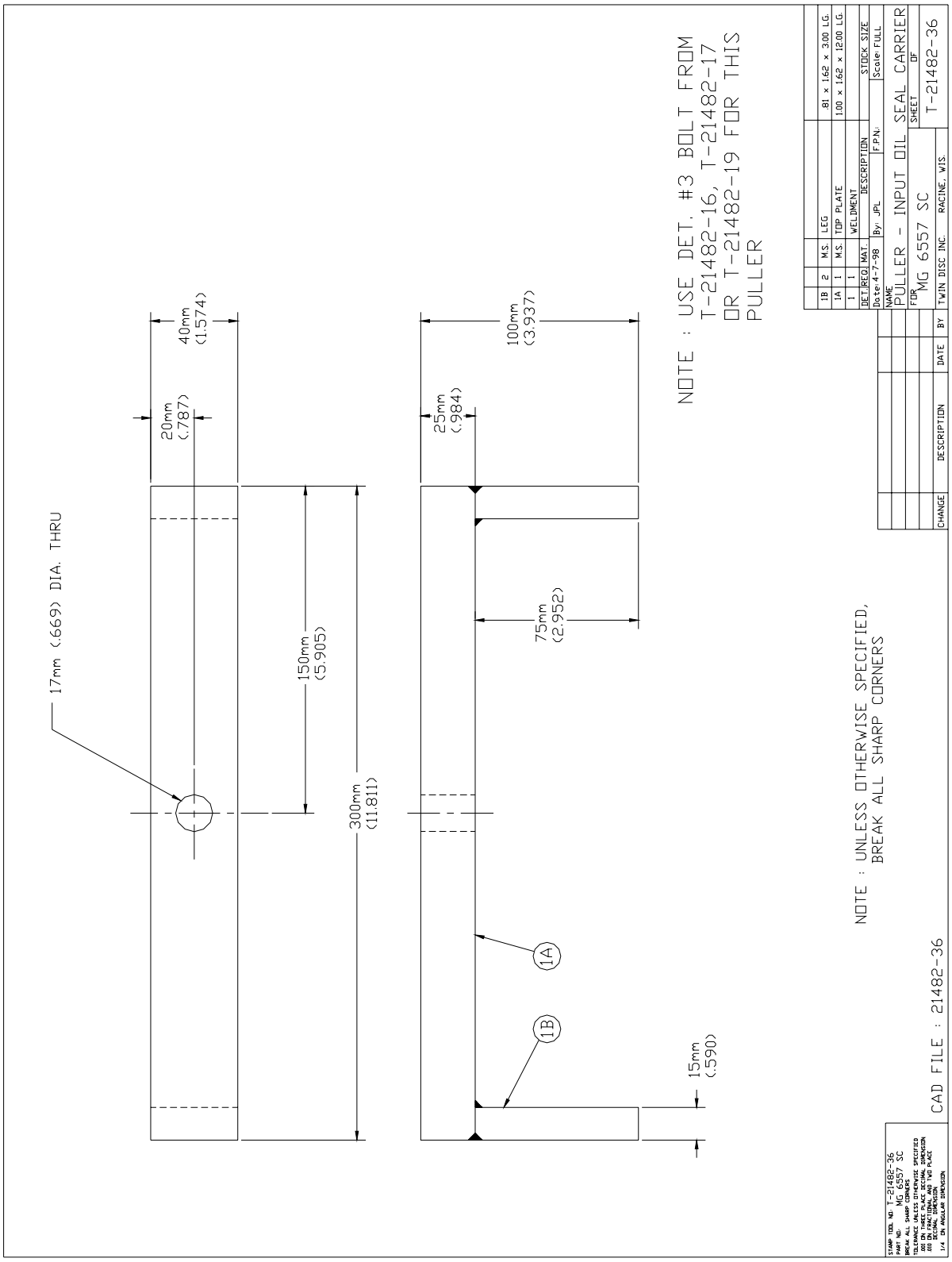
TOOL NUMBER	"A" DIM.	"B" DIM.	FOR MODEL
T-21482-26	198mm	20mm	ALL MODELS
T-21482-27	178mm	20mm	ALL MODELS
T-21482-28	108mm	20mm	MG 6600 DC
T-21482-29	144mm *	20mm	MG 6557
T-21482-32	168mm	20mm	MG 6619
T-21482-33	141mm *	20mm	MG 6619
T-21482-34	188mm	20mm	MG 6619
T-21482-35	98mm	20mm	MG 6557

T-21482-30 Bearing Driver

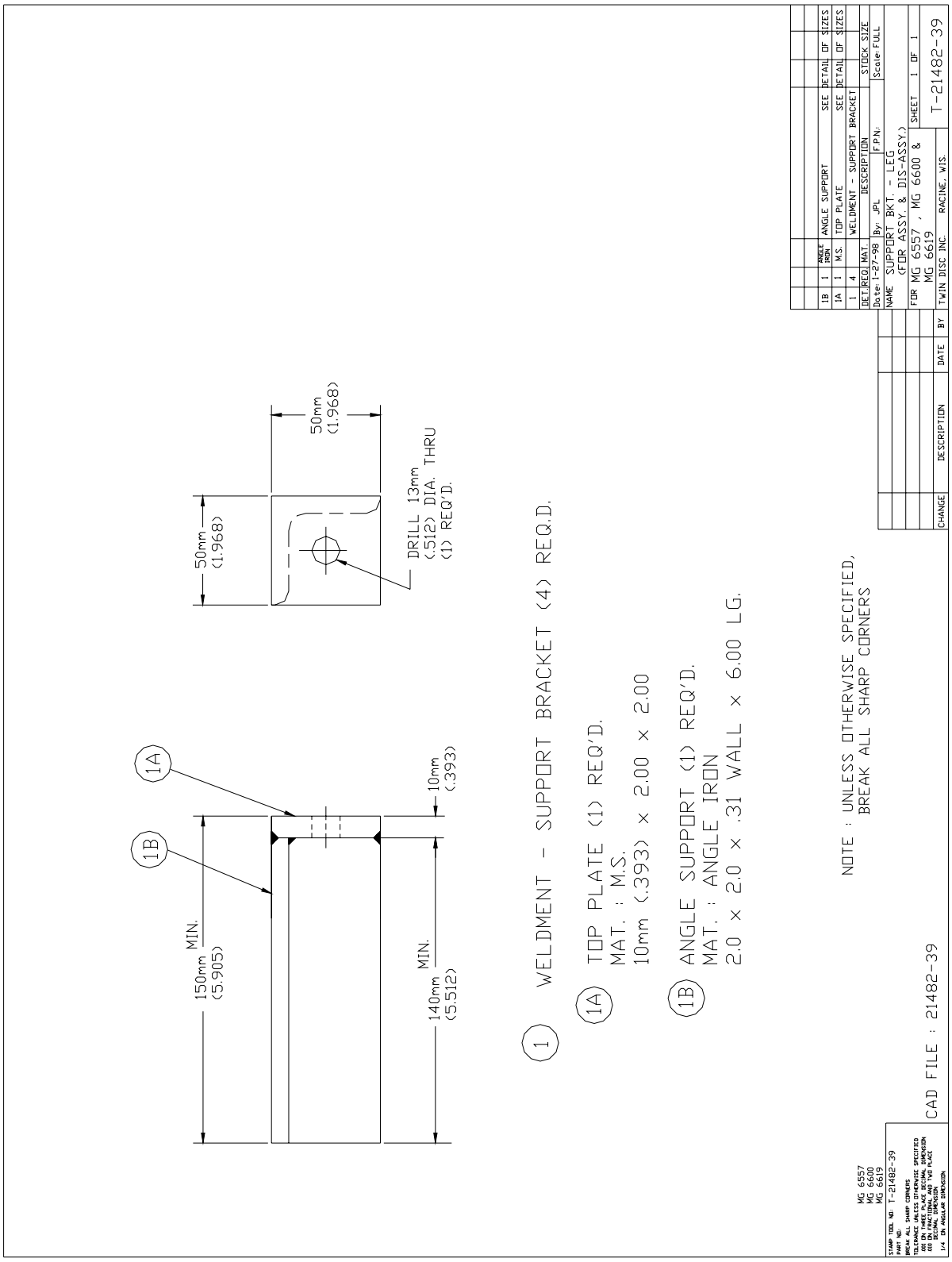


TOOL NUMBER	"A" DIM.	"B" DIM.	"C" DIM.	"D" DIM.	FOR MODELS
T-21482-30	198mm	185mm	150mm	160mm	MG 6600DC & MG 6557
T-21482-31	158mm	145mm	125mm	135mm	MG 6557 & MG 6619
T-21482-38	178mm	165mm	120mm	130mm	MG 6619

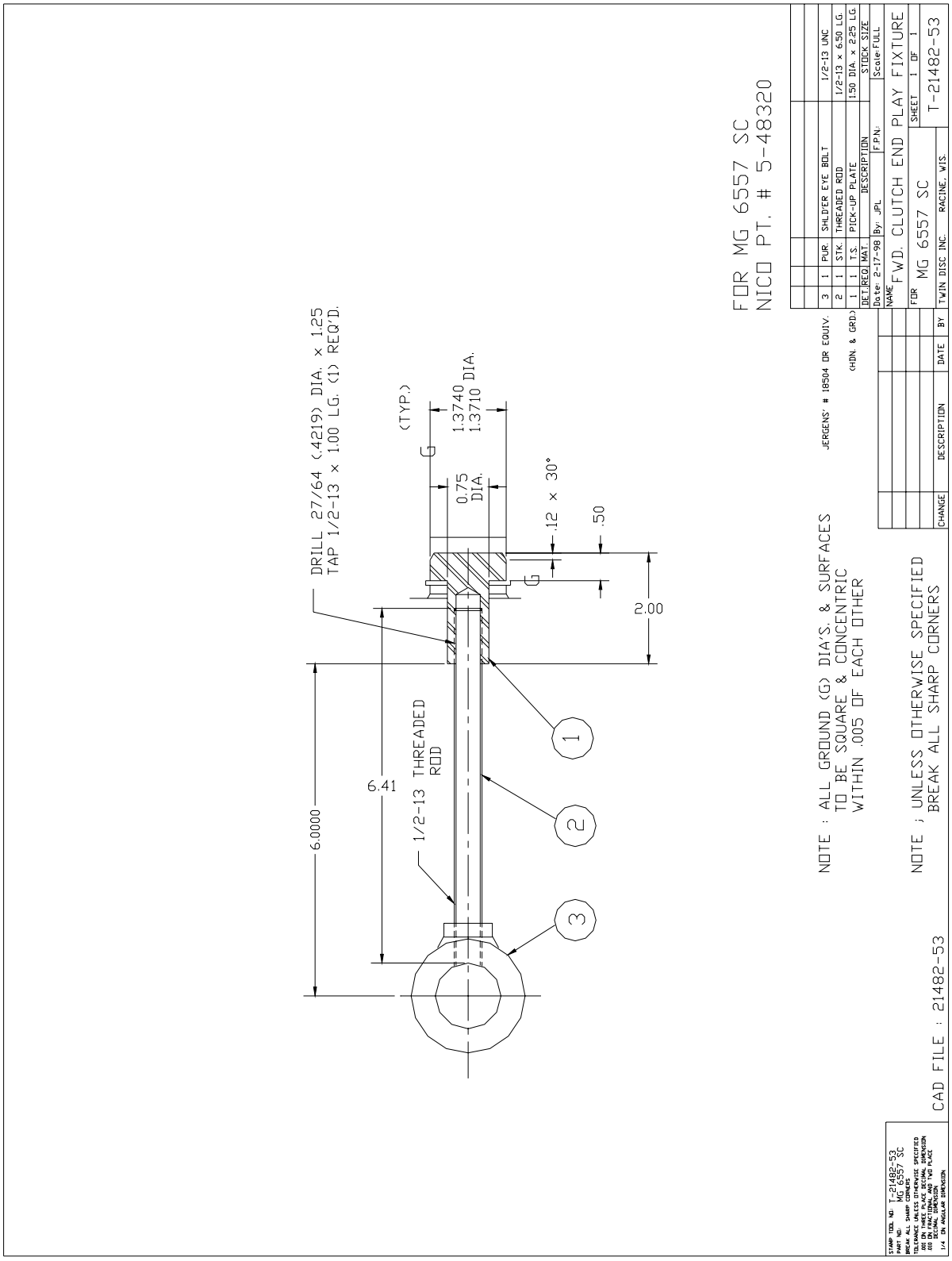
T-21482-36 Input Oil Seal Carrier Puller



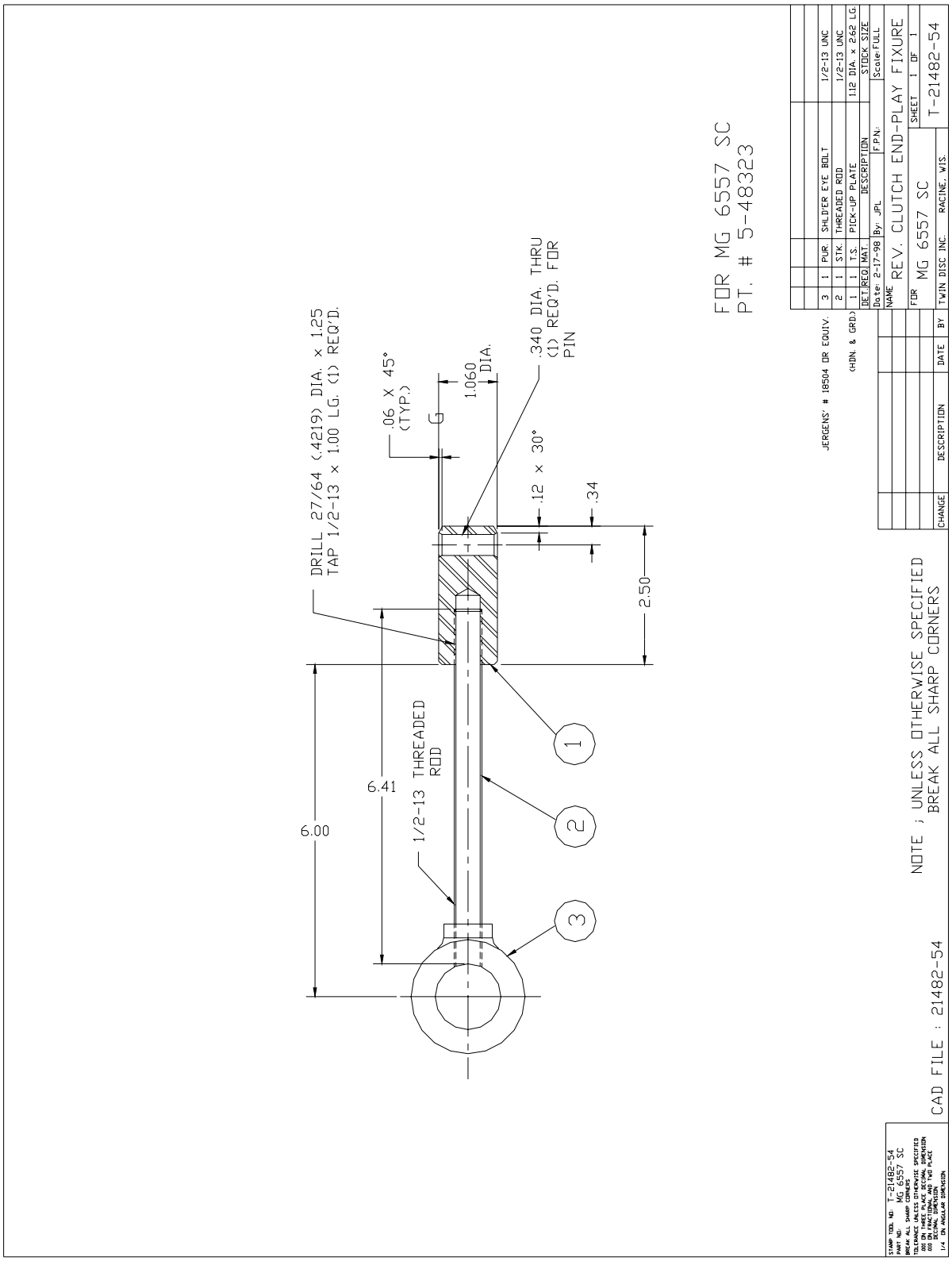
T-21482-39 Support Bracket (Leg)


50mm (1.968)
50mm (1.968)
DRILL 13mm (.512) DIA. THRU (1) REQ'D.
1A
1B
10mm (.393)
150mm MIN. (5.905)
140mm MIN. (5.512)
1 WELDMENT - SUPPORT BRACKET (4) REQ.D.
1A TOP PLATE (1) REQ'D.
MAT. : M.S.
10mm (.393) x 2.00 x 2.00
1B ANGLE SUPPORT (1) REQ'D.
MAT. : ANGLE IRON
2.0 x 2.0 x .31 WALL x 6.00 LG.
NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS
CAD FILE : 21482-39
1B 1 ANGLE SUPPORT SEE DETAIL OF SIZES
1A 1 M.S. TOP PLATE SEE DETAIL OF SIZES
1 4 WELDMENT - SUPPORT BRACKET STOCK SIZE
DET. REQ'D MAT. DESCRIPTION F.P.N.
Date 1-27-98 By: JPL Scale-FULL
NAME SUPPORT BKT. - LEG
(FOR ASSY. & DIS-ASSY.)
FOR MG 6557 , MG 6600 & MG 6619
SHEET 1 OF 1
TWIN DISC INC. RACINE, WIS.
T-21482-39
CHANGE DESCRIPTION DATE BY
MG 6557
MG 6600
MG 6619
STAMP TOOL NO. T-21482-39
PART NO.
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

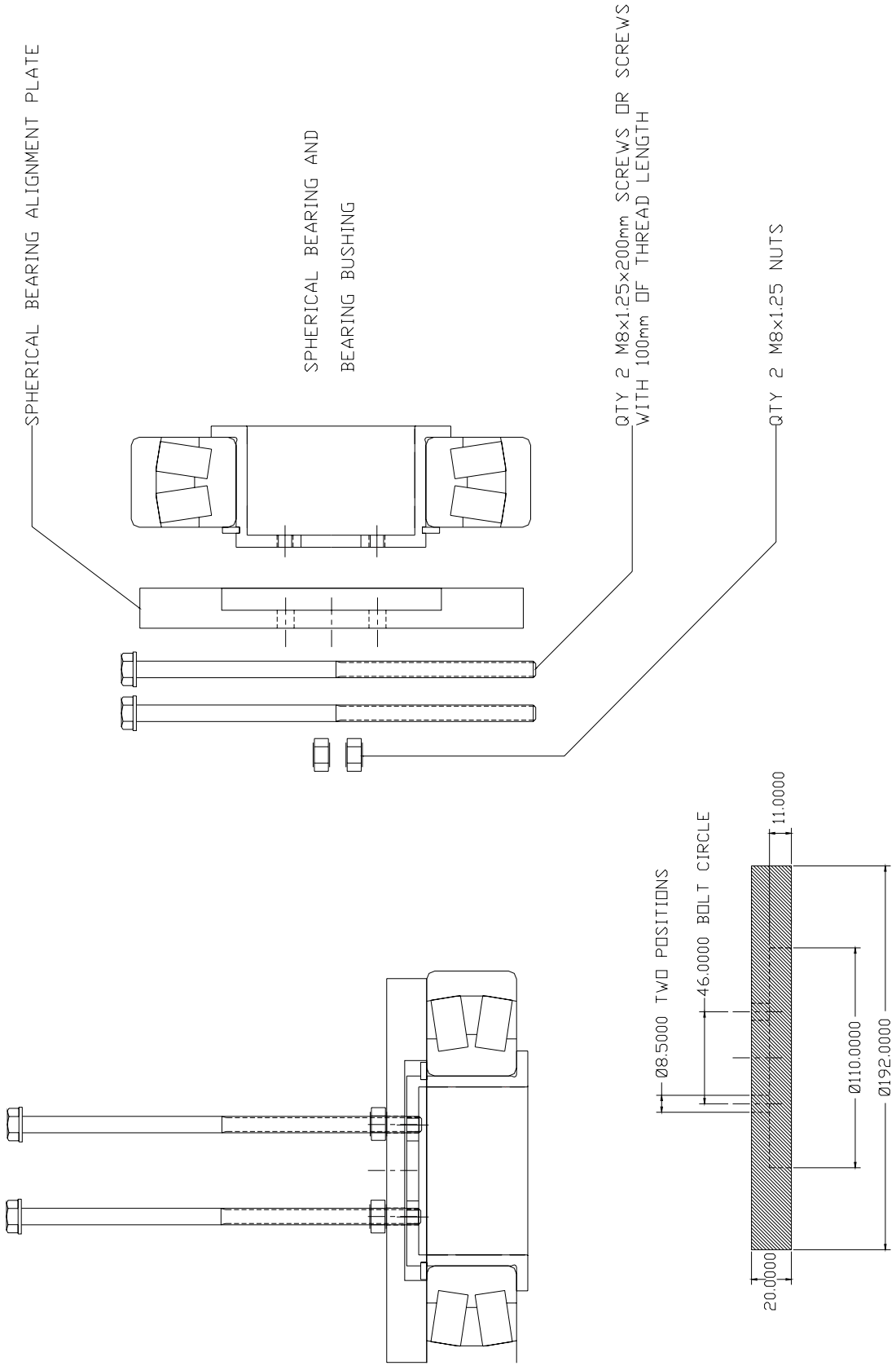
T-21482-53 Primary Clutch End Play Fixture


FOR MG 6557 SC
NICO PT. # 5-48320
DRILL 27/64 (.4219) DIA. x 1.25
TAP 1/2-13 x 1.00 LG. (1) REQ'D.
(TYP.)
1.3740
1.3710 DIA.
0.75
DIA.
.12 x 30°
.50
2.00
6.41
6.0000
1/2-13 THREADED
ROD
1
2
3
NOTE : ALL GROUND (G) DIA'S. & SURFACES
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER
NOTE ; UNLESS OTHERWISE SPECIFIED
BREAK ALL SHARP CORNERS
CAD FILE : 21482-53
JERGENS' # 18504 OR EQUIV.
(HDN. & GRD.)
3 1 PUR. SHLD'ER EYE BOLT 1/2-13 UNC
2 1 STK. THREADED ROD 1/2-13 x 6.50 LG.
1 1 T.S. PICK-UP PLATE 1.50 DIA. x 2.25 LG.
DET. REQ'D MAT. DESCRIPTION STOCK SIZE
Date 2-17-98 By: JPL F.P.N.: Scale-FULL
NAME FWD. CLUTCH END PLAY FIXTURE
FOR MG 6557 SC SHEET 1 OF 1
CHANGE DESCRIPTION DATE BY TWIN DISC INC. RACINE, WIS. T-21482-53
STAMP TOOL NO. T-21482-53
PART NO. MG 6557 SC
REMOVE ALL SHARP EDGES
UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

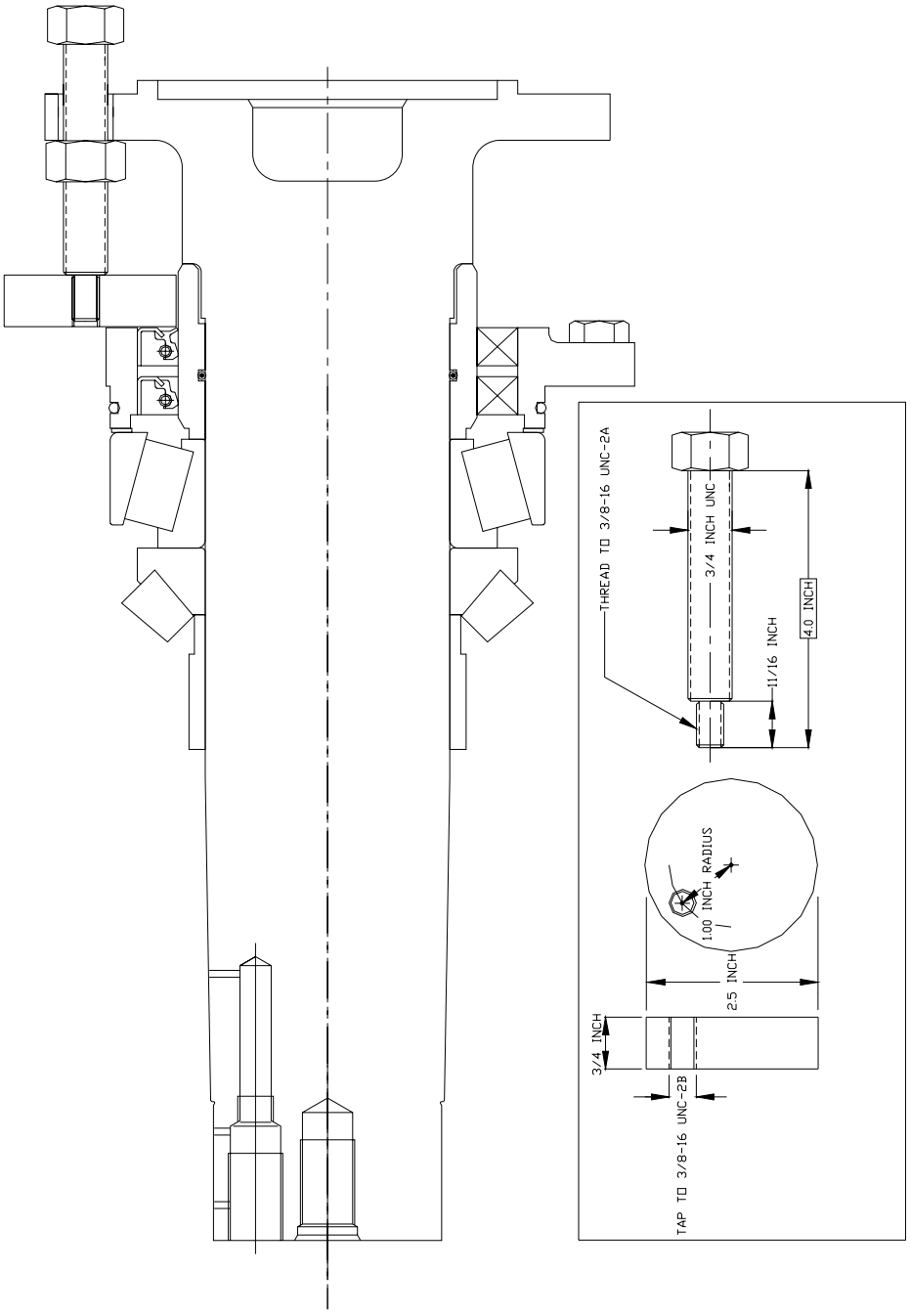
T-21482-54 Secondary Clutch End Play Fixture

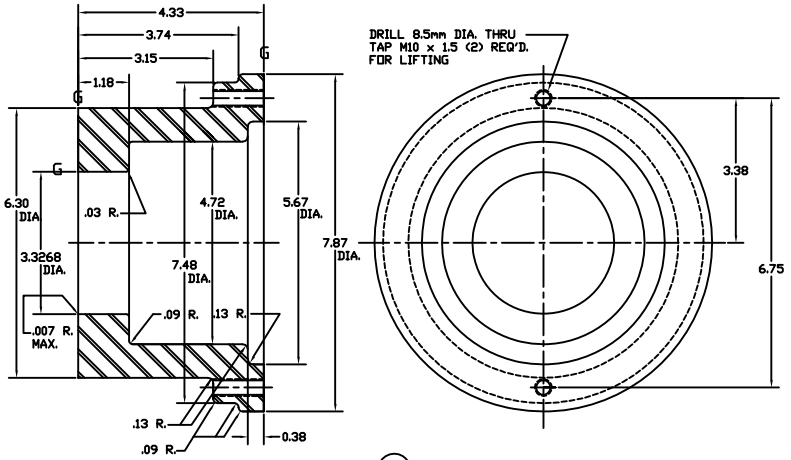


T-21578-1 Output Flange Installing Fixture (Sheet 3 of 3)

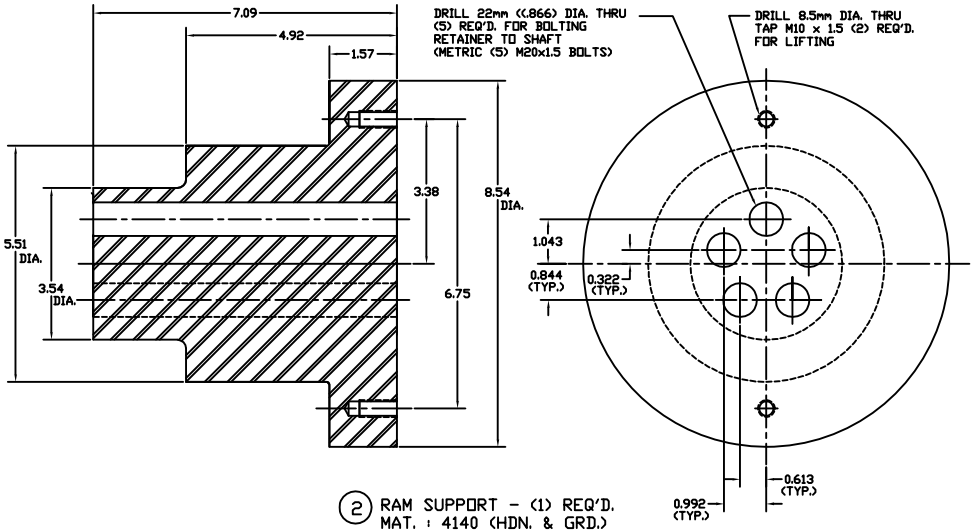


T-21578-4 Output Shaft Bearing Driver (Sheet 1 of 2)

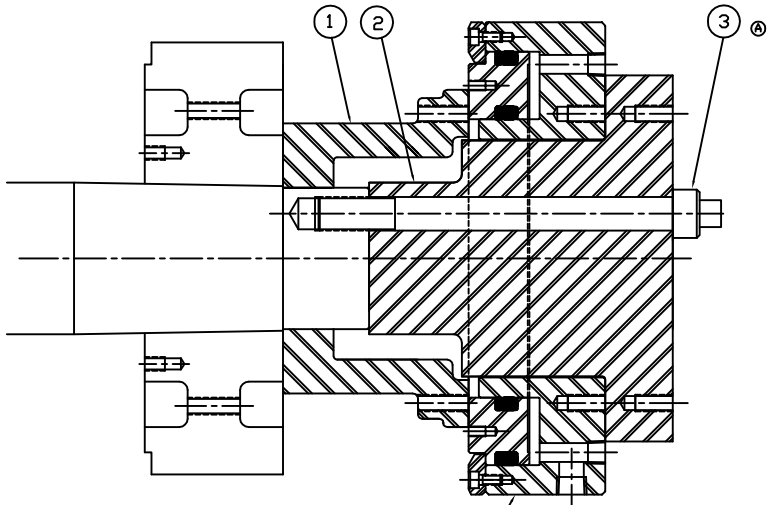


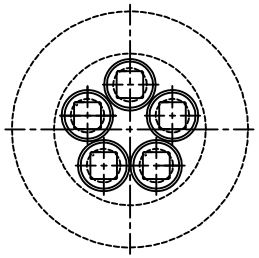


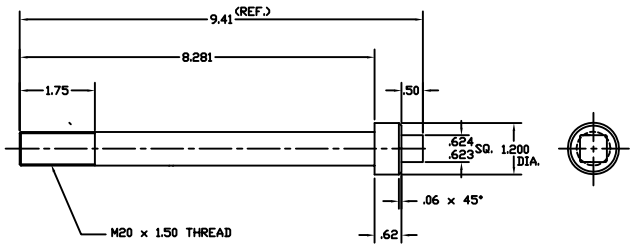
(1) RAM BASE - (1) REQ'D.
MAT. : 4140 (HDN. & GRD.)



(2) RAM SUPPORT - (1) REQ'D.
MAT. : 4140 (HDN. & GRD.)







(A) (3) SPECIAL HIGH STRENGTH BOLT (5) REQ'D.
MATERIAL : HIGH STRENGTH STEEL

NOTE :
UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

NOTE :
ALL GRD. DIA'S. & SURFACES MUST BE
SQUARE & CONCENTRIC TO WITHIN
.005 OF EACH OTHER

(B) 150 TONS OF FORCE
AT 7250 LBS. HYDRAULIC
PRESSURE.
NOTE: PRESSURE NOT TO
EXCEED 7250 LBS.

(A)	3	5	3/8	SPECIAL HIGH STRENGTH BOLT	1.25 DIA. x 10.00 LG.
CHDN. & GRD.)	2	1	4140	RAM SUPPORT	8.70 DIA. x 7.25 LG.
CHDN. & GRD.)	1	1	4140	RAM BASE	8.00 DIA. x 4.38 LG.
REF.	MDEL NAT.			DESCRIPTION	STOCK SIZE

Date 8-8-97 By JPL FPJU Scale FULL

TITLE: OUTPUT SHAFT TO BULL GEAR PULLER

FOR MG 6557

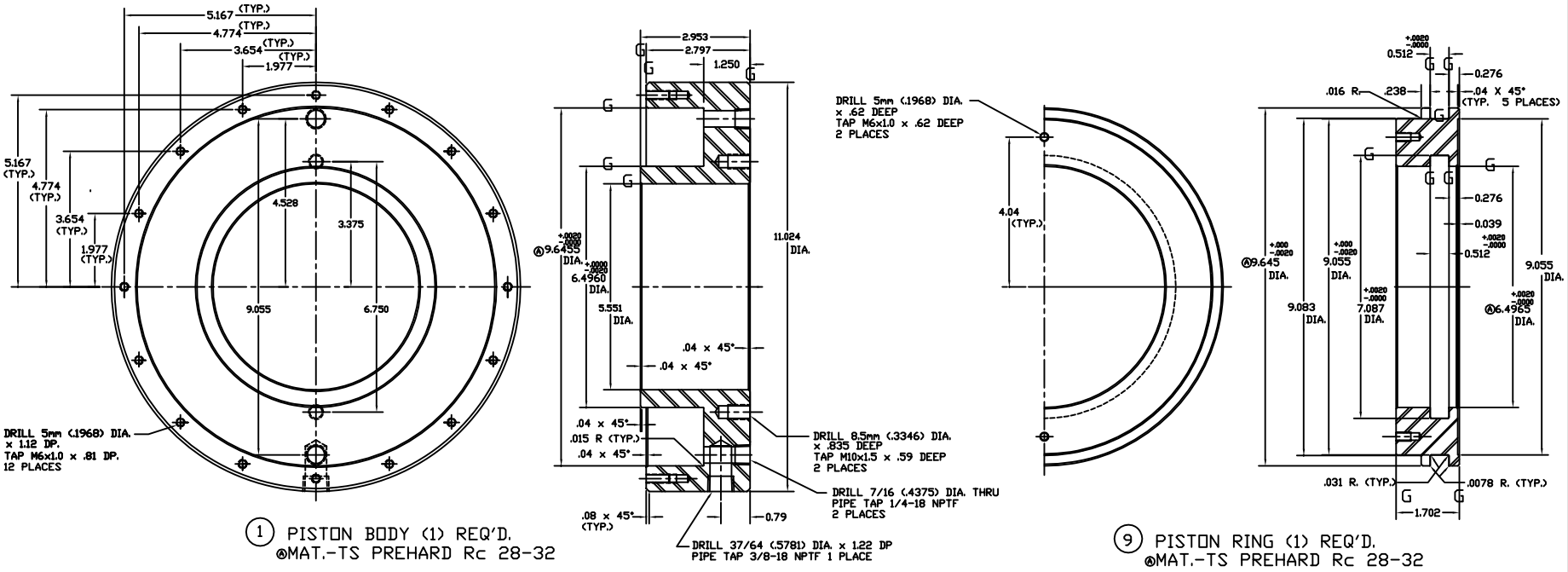
SHEET 1 OF 1

T-21482

CHANGE	DESCRIPTION	DATE	BY
B	APPLICATION NOTE ADDED	10-10-96	KJB
A	DET. 6 3 BOLT RE-DESIGNED	10-23-96	JPL

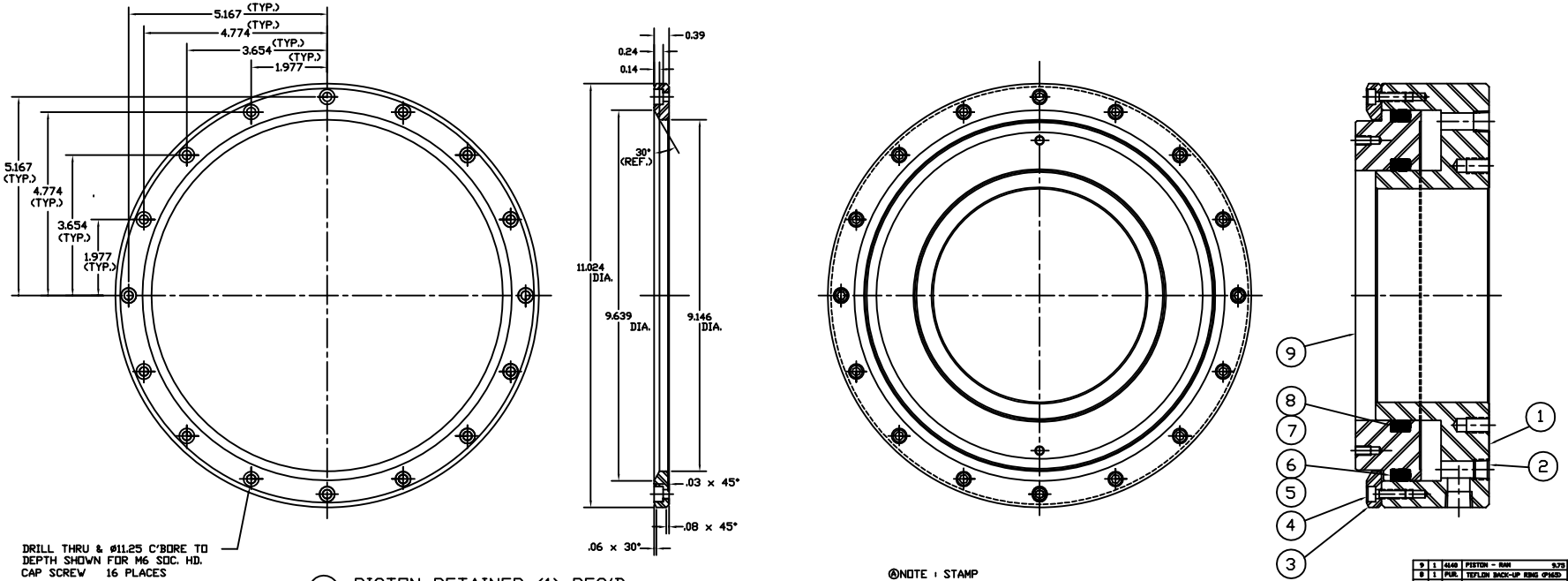
TVH DISC INC. RACINE, WIS.

CAD FILE : 21482



① PISTON BODY (1) REQ'D.
ⒶMAT.-TS PREHARD Rc 28-32

⑨ PISTON RING (1) REQ'D.
ⒶMAT.-TS PREHARD Rc 28-32



③ PISTON RETAINER (1) REQ'D.
ⒶMAT.-TS PREHARD Rc 28-32

ⒶNOTE : STAMP
"MAXIMUM OPERATING PRESSURE = 7250 PSI"
IN O.D. OF DETAIL# 1 WITH MINIMUM 1/4 INCH HIGH LETERING

NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GRD. DIA'S. & SURFACES MUST BE SQUARE & CONCENTRIC TO WITHIN .001 OF EACH OTHER

ITEM	QTY	MAT'L	DESCRIPTION	SIZE
9	1	4140	PISTON - RAM	9.75 DIA. x 1.39 THK.
8	1	PUR.	TEFLON BACK-UP RING (PI63D)	
7	1	PUR.	*O'RING (P163D)	
6	1	PUR.	TEFLON BACK-UP RING (PI23D)	
5	1	PUR.	*O'RING (P123D)	
4	16	STK.	SOC. HD. CAP SCREW -METRIC	M6x1.0x25mm LG.
3	1	4140	PISTON RETAINTER	11.25 DIA. x .39 THK.
2	2	STK.	PIPE PLUG (HEXHD)	1/4-18 NPTF
1	1	4140	RAM - BODY	11.25 DIA. x 3.25 THK.

REV	DESCRIPTION	DATE	BY
A	UPDATE PRINT PER ENG. REQUEST.	11-29-2006	THV

Date 9-19-97 By: JPL F.P.N. Scale: FULL

NAME RAM - GEAR TO SHAFT

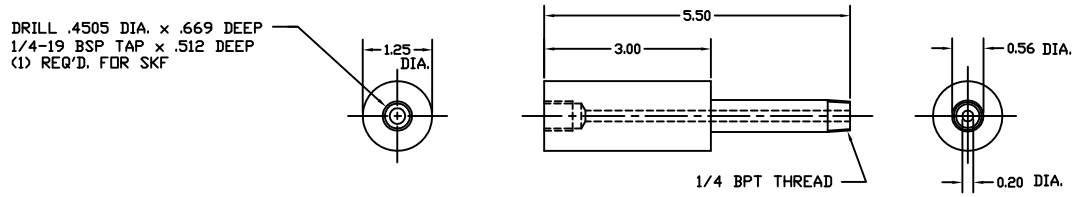
FOR MG 6000

SHEET 1 OF 1

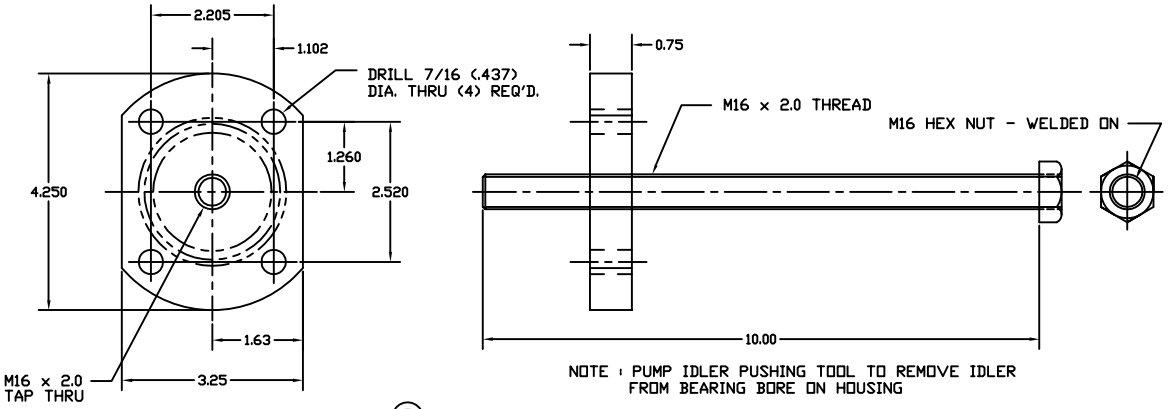
T-21482-2

TVIH REC INC. RACINE, WIS.

CAD FILE : T-21482-2.DWG

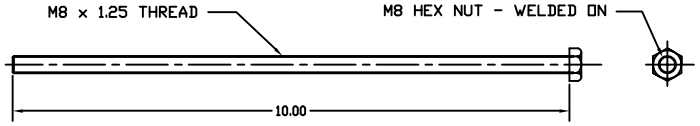


② SKF REMOVING TOOL (1) REQ'D.
MAT. - TOOL STEEL



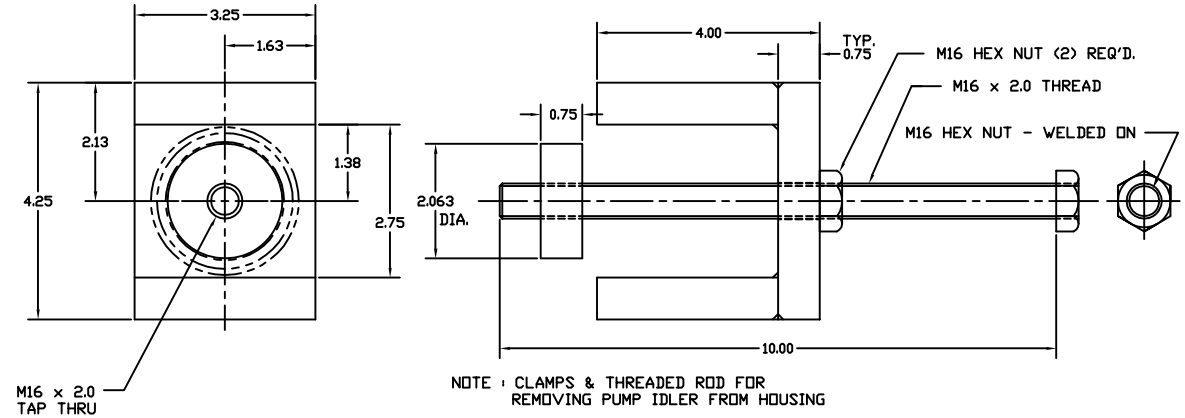
NOTE : PUMP IDLER PUSHING TOOL TO REMOVE IDLER FROM BEARING BORE ON HOUSING

③ PUMP IDLER PUSHING TOOL (1) REQ'D.
MAT. : (1) M16 x 2.0 THREADED ROD
MAT. : (1) TOOL STEEL



THREADED ROD - TO REMOVE OUTPUT BEARING & CARRIER FROM INPUT SIDE OF HOUSING

① PULLER ROD - (2) REQ'D.
MAT. - METRIC THREADED ROD WITH NUT



NOTE : CLAMPS & THREADED ROD FOR REMOVING PUMP IDLER FROM HOUSING

④ PUMP IDLER BEARING PULLER
MAT. : (1) M16 x 2.0 THREADED ROD
MAT. : (1) WELDMENT
(1) TOOL STEEL (.75 x 3.25 x 4.38)
(2) TOOL STEEL (.75 x 3.25 x 3.38)

(SEE DETAIL FOR MAT. & SIZE)	4	1		PUMP IDLER BRG. PULLER	
(SEE DETAIL FOR MAT. & SIZE)	3	1		PUMP IDLER PUSHING TOOL	
	2	1	T.S.	SKF REMOVING TOOL	1.25 DIA. x 5.75 LG.
	1	1	STK.	PULLER ROD	M8 x 1.25 x 10.250 LG.
	DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE

Date: 10-20-97 By: JPL F.P.M. Scale: FULL

NAME: REMOVING TOOLS FOR MG 6557SC

FOR: MG 6557 SC

SHEET 1 OF 3

T-21482-40

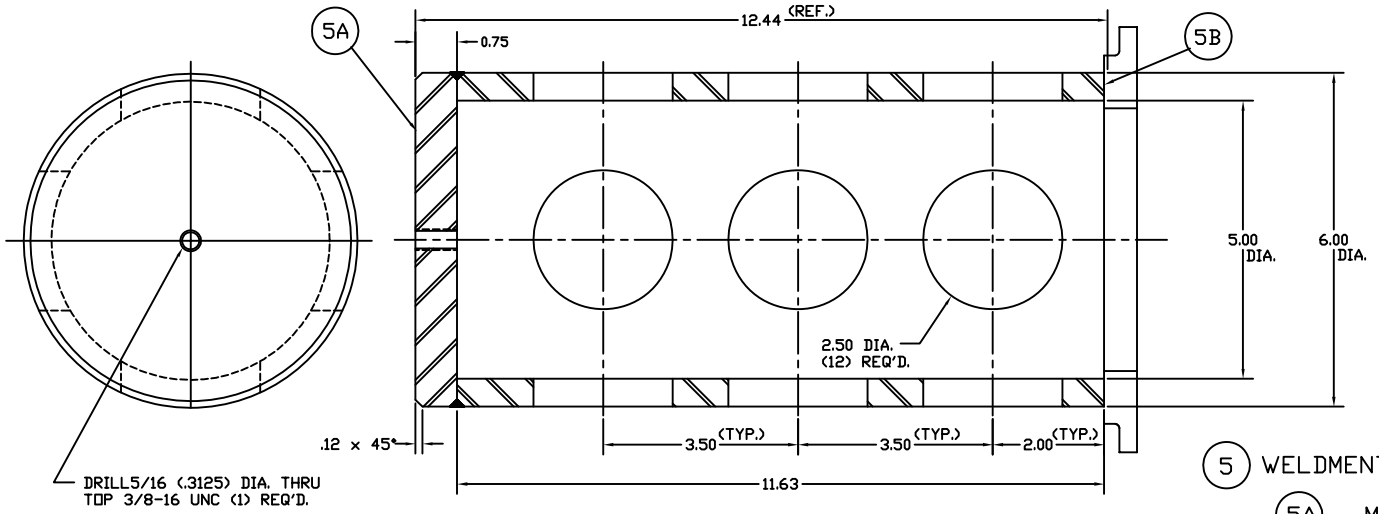
TWIN DISC INC. RACINE, WIS.

CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-40
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED ARE ON THREE PLACE DECIMAL DIMENSIONS ARE ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSIONS
1/4 ON ANGULAR DIMENSION

CAD FILE : 21482-40

CAD FILE : 21482-40

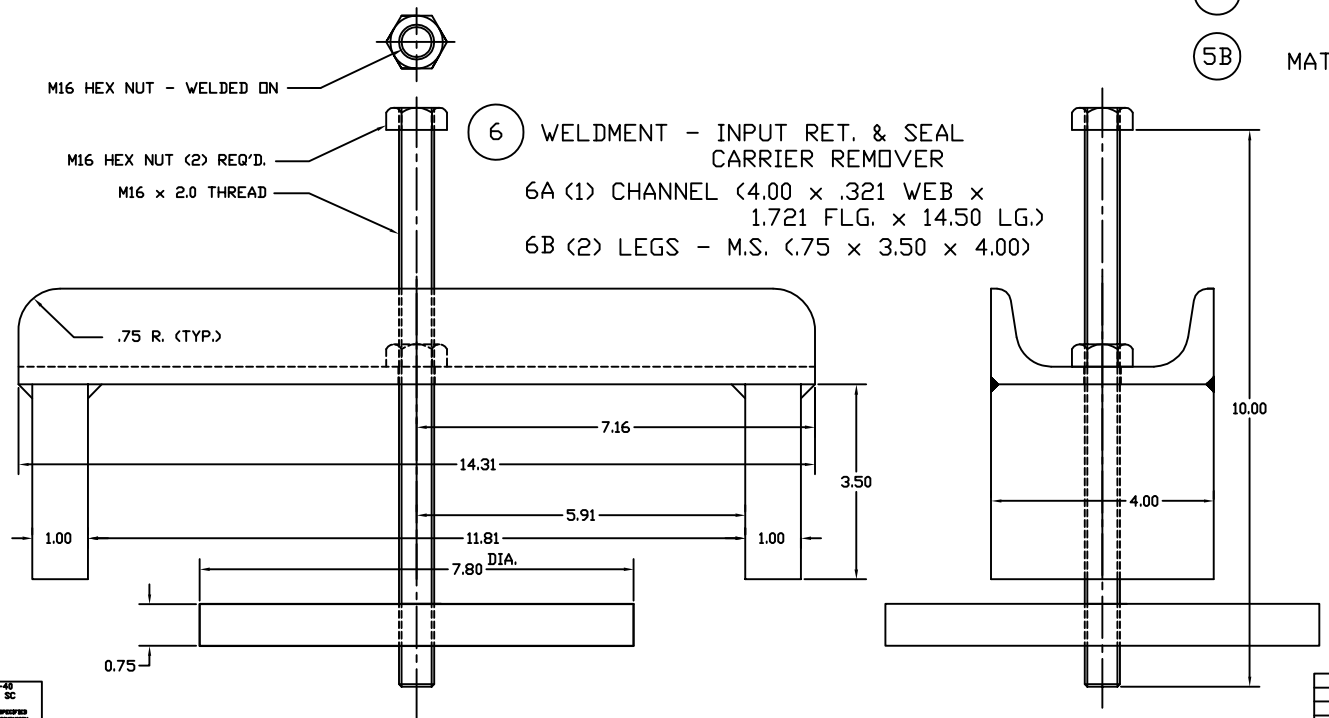


NOTE : PRESSING FIXTURE TO REMOVE BACKING PLATE RETAINER SPRING FROM FORWARD & REVERSE CLUTCH PACKS

(5) WELDMENT - PRESSING FIXTURE - (1) REQ'D.

(5A) - MAT. : M.S. - 5.38 DIA. x .75 THICK

(5B) MAT. : STEEL TUBING 6.00 O.D. x .50 WALL x 12.00 LG



(6) WELDMENT - INPUT RET. & SEAL CARRIER REMOVER

6A (1) CHANNEL (4.00 x .321 WEB x 1.721 FLG. x 14.50 LG.)

6B (2) LEGS - M.S. (.75 x 3.50 x 4.00)

NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES TO BE SQUARE & CONCENTRIC WITHIN .005 OF EACH OTHER

FOR MG 6557 SC
DET. # 5 FOR BOTH
INSTALLING & REMOVING
CLTCH BACK PLATE
PT. # 3-49168

CAD FILE : 2148240A

CAD FILE : 2148240A

(SEE DETAIL FOR MAT. & INFO.)	6	1		WELDMENT-CARRIER REMOVER
(SEE DETAIL FOR MAT. & INFO.)	5	1		WELDMENT- PRESSING FIXTURE
DET.	REQ'D	MAT.	DESCRIPTION	STOCK SIZE

Date: 10-20-97 By: JPL F.P.M. Scale: FULL

NAME: REMOVING TOOLS FOR MG6557SC

FOR: MG 6557 SC

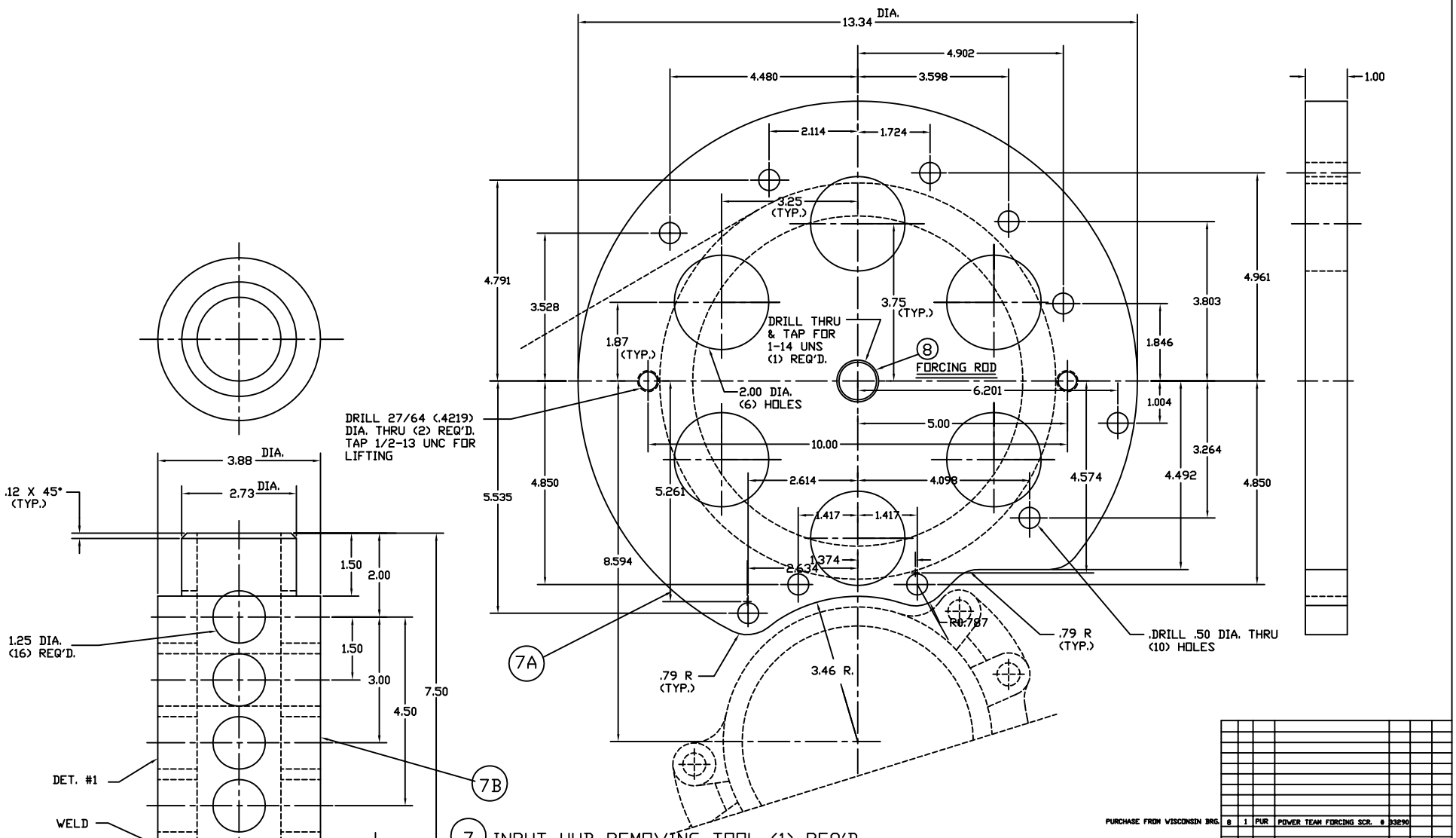
SHEET 2 OF 3

T-21482-40

TWIN DISC INC. RACINE, WIS.

CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-40
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED ARE ON THREE PLACE DECIMAL DIMENSIONS ARE ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSIONS
1/4 ON ANGULAR DIMENSION



7 INPUT HUB REMOVING TOOL (1) REQ'D.

7A BASE PLATE - MAT. = M.S. - 13.50 DIA. x 1.00 THK.

7B PUSHER - MAT. = T.S. - 4.00 DIA. x 7.62 LG.

CAD FILE : 21482-40 B

CAD FILE : 2148240B

PURCHASE FROM WISCONSIN BRG.	8	1	PUR	POWER TEAM FORCING SCR. # 33290	
(SEE DETAIL FOR MAT. & SIZE)	7B	1	T.S.	PUSHER	
(SEE DETAIL FOR MAT. & SIZE)	7A	1	M.S.	BASE PLATE	
	7	1		REMOVING TOOLS	
	DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE

Date: 10-22-97 By: JPL F.P.M: Scale: FULL

NAME: REMOVING TOOLS FOR MG6557SC

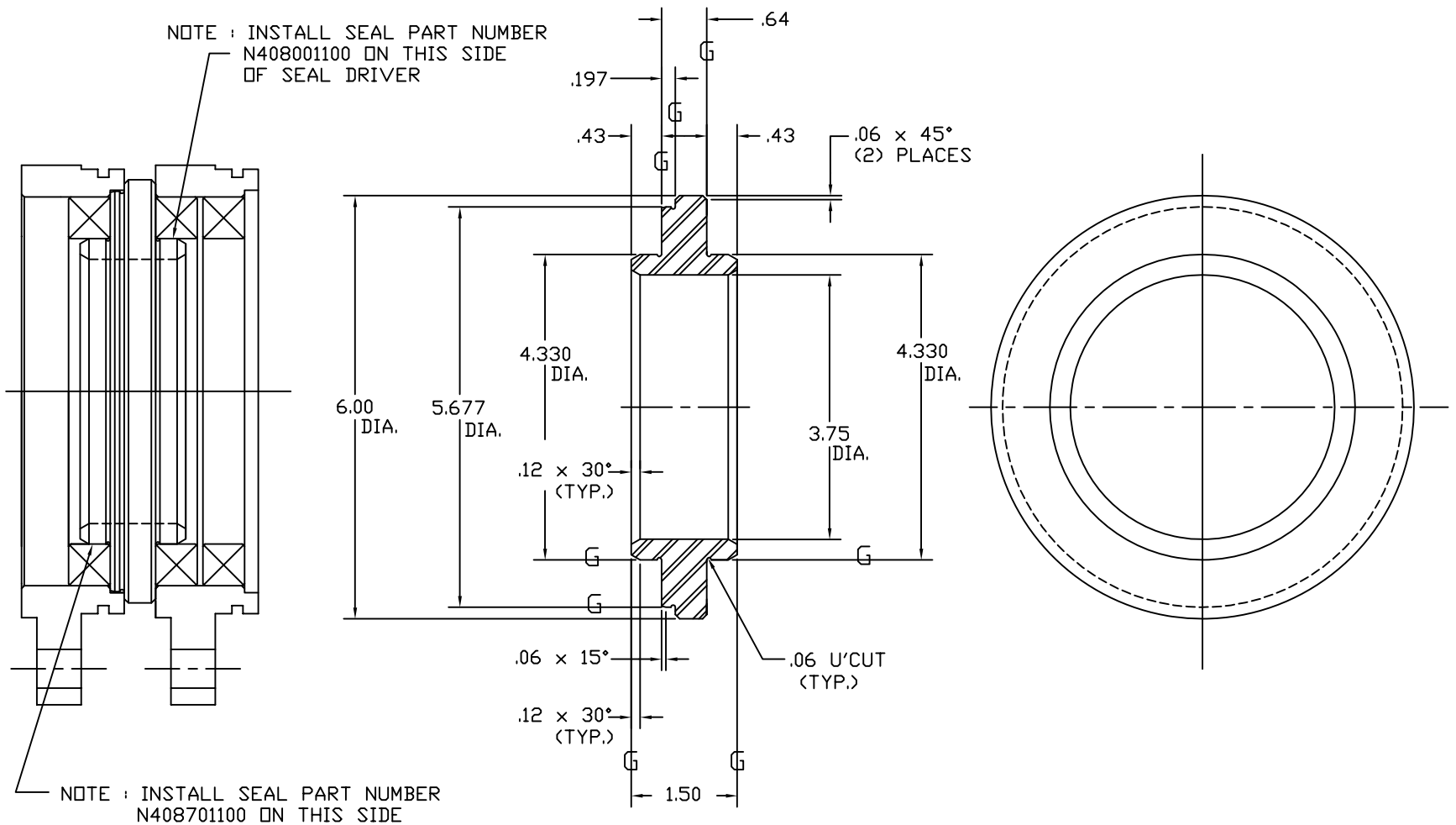
FOR: MG 6557 SC

SHEET 3 OF 3

T-21482-40

TWIN DISC INC. RACINE, WIS.

CHANGE	DESCRIPTION	DATE	BY



FOR MG 6557 SC
INSTALL SEALS :
N408001100
N408701100

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

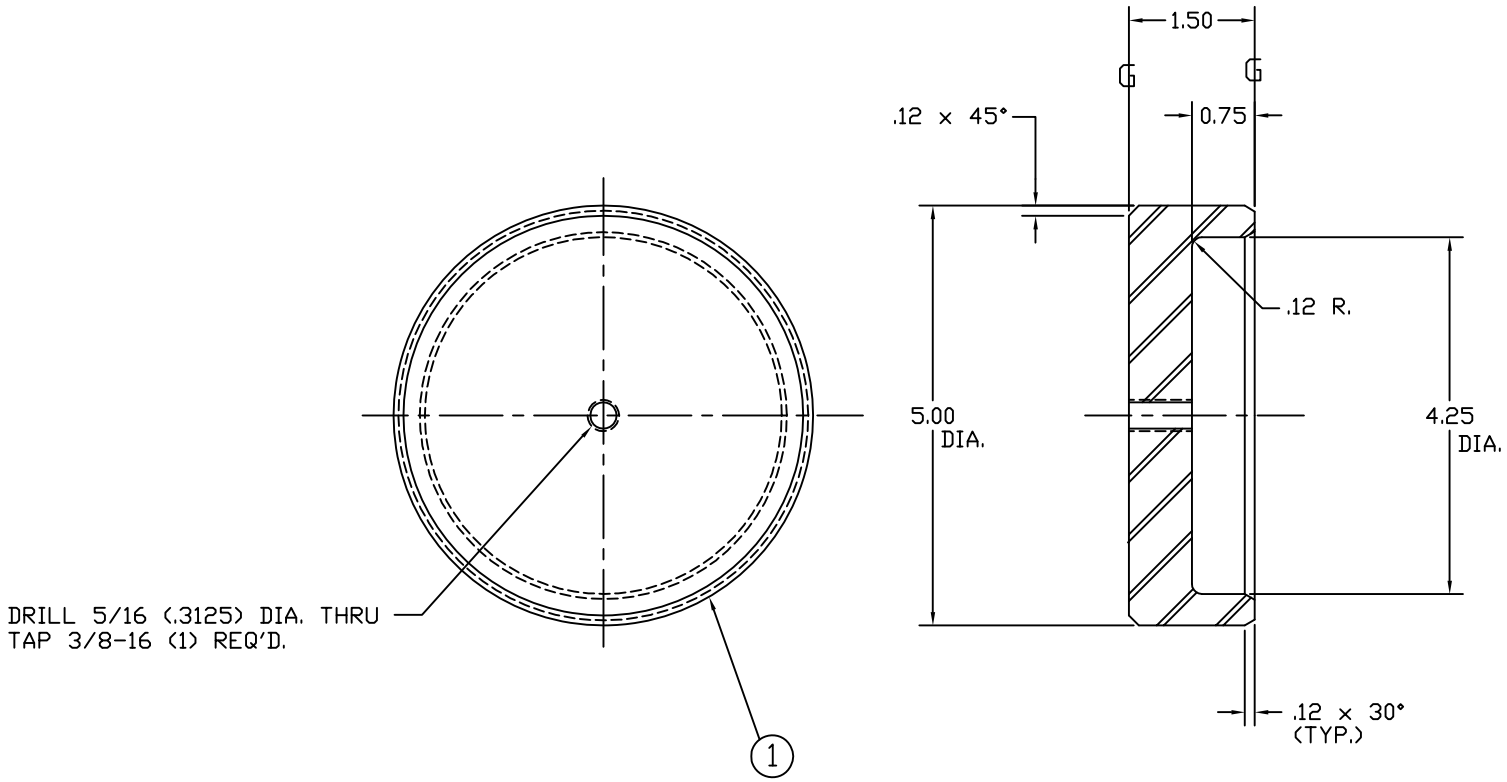
NOTE : ALL GROUND (G) DIA'S. & SURFACES
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER

CHANGE	DESCRIPTION	DATE	BY		

(CARB. & HDN.)	1	1	T.S.	DRIVER - SEAL	6.25 DIA. x 1.62 THK.
	DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
	Date: 2-21-98		By: JPL	F.P.N.:	Scale: FULL
NAME	DRIVER - SEAL				
FOR	MG 6557 SC				SHEET 1 OF 1
TWIN DISC INC. RACINE, WIS.					T-21482-41

STAMP TOOL NO: T-21482-41
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : 21482-41



FOR MG 6557 SC
BEARING DRIVER FOR
PRESSING BRG. # 1-77711
INTO BRG. CARRIER # 1-77294

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

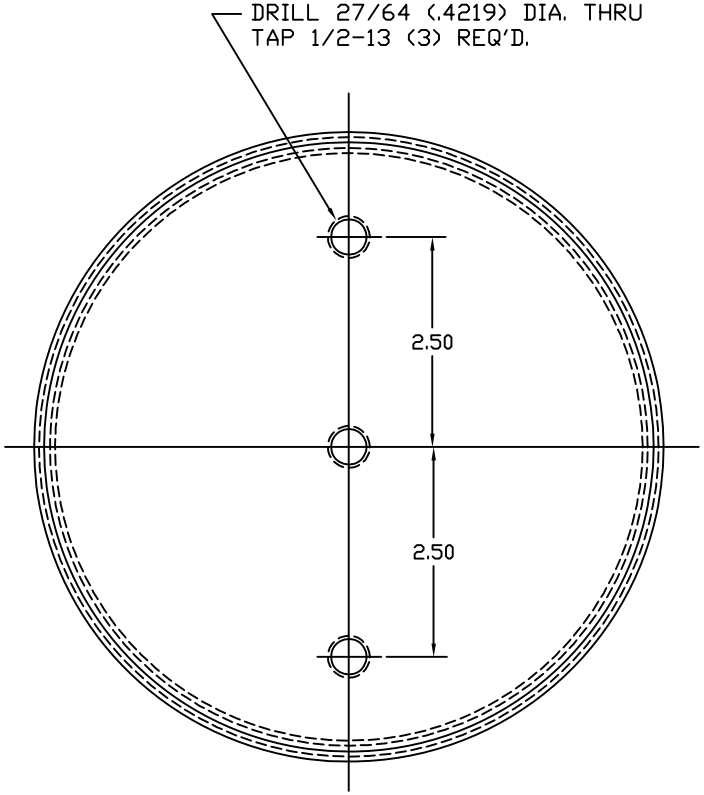
NOTE : ALL GROUND (G) SURFACES & DIA'S.
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER

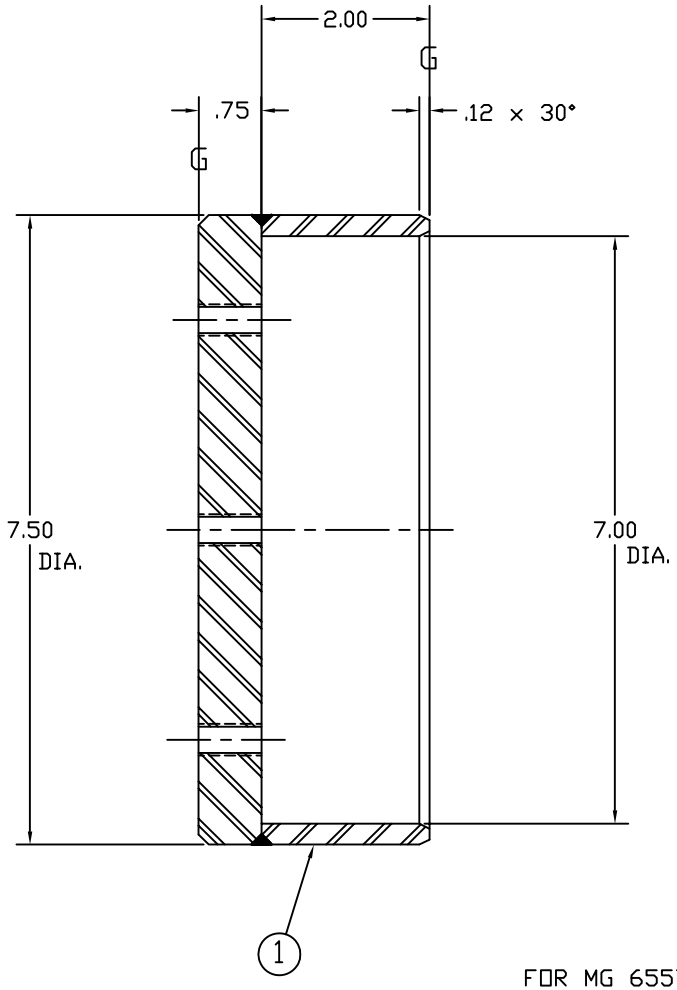
1	1	T.S.	DRIVER (CARB. & HDN.)	5.00 DIA. x 1.75
DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
Date: 2-20-98	By: JPL		F.P.N.	Scale: FULL
NAME	BEARING DRIVER			
FOR	MG 6557 SC			SHEET 1 OF 1
TWIN DISC INC. RACINE, WIS.				T-21482-42

CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-42
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : 21482-42





(1) WELDMENT (1) REQ'D.
SEE DET'S. FOR
MAT. & HEAT TREAT

FOR MG 6557 SC
BEARING DRIVER TO INSTALL
BRG. CARRIER ASS'Y. #1-77294 &
BRG. #1-77711 INTO MAIN HOUSING

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER

(CARB. & HDN.)

DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
1B	1	M.S.	CAP	7.50 DIA. x .75 THK.
1A	1	STEEL TUBE	TUBING 7.50 D. x	25 WALL x 2.25 LG.
1	1		WELDMENT - BRG. DRIVER	

Date: 2-20-98 By: JPL F.P.N.: Scale: FULL

NAME
BEARING DRIVER - CARRIER ASSY.

FOR
MG 6557 SC

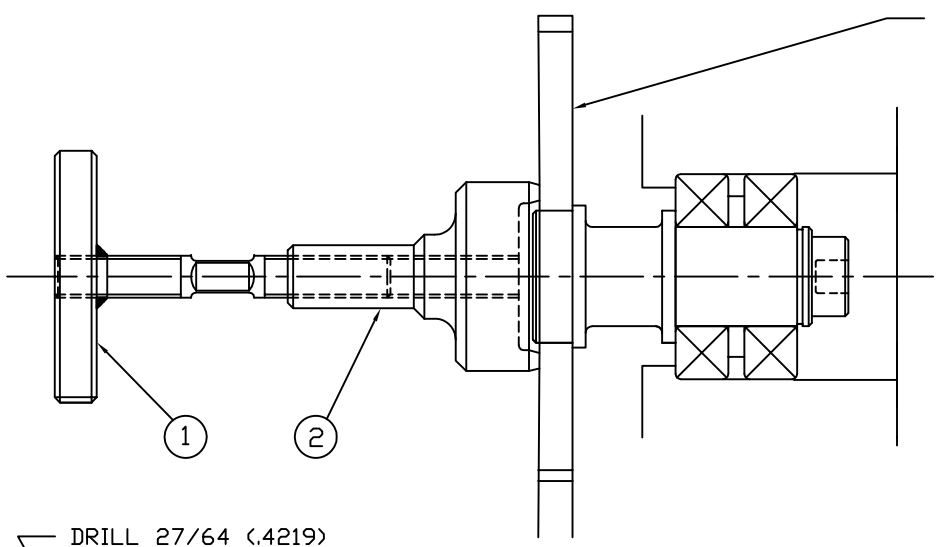
SHEET OF
T-21482-43

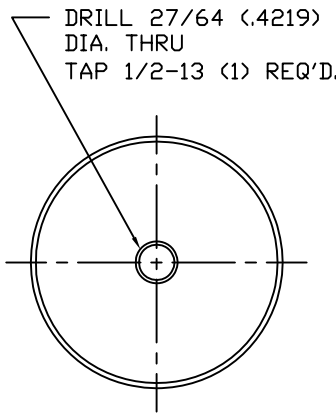
TWIN DISC INC. RACINE, WIS.

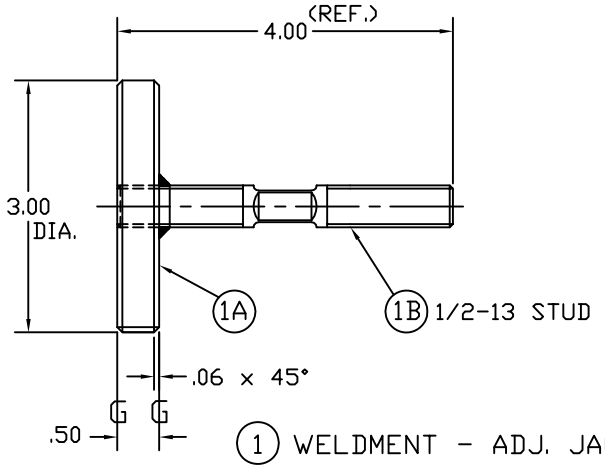
CHANGE	DESCRIPTION	DATE	BY

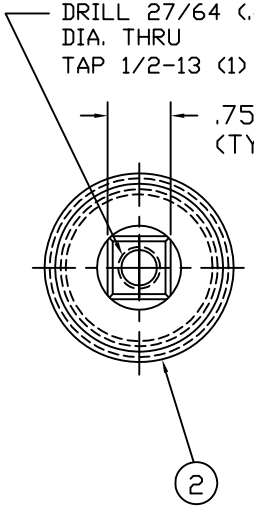
STAMP TOOL NO: T-21482-43
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

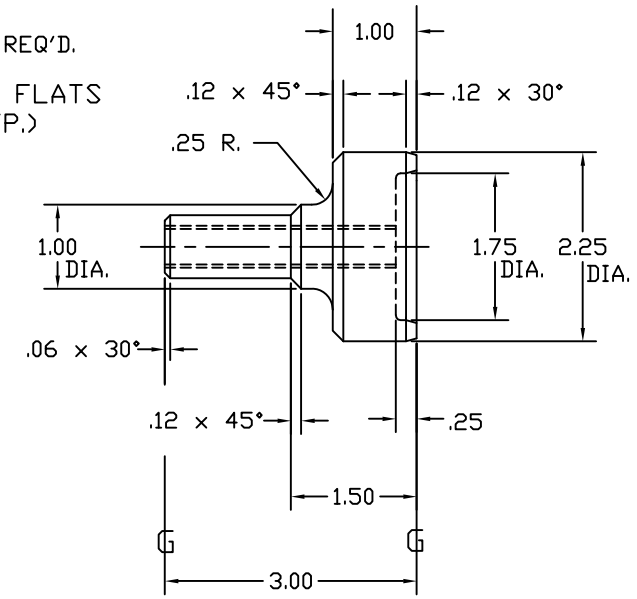
CAD FILE : 21482-43











(1) WELDMENT - ADJ. JACK BASE (1) REQ'D.

(1A) JACK BASE (1) REQ'D.
MAT. : T.S. (CARB. & HDN.)

(1B) STUD (1) REQ'D.
1/2-13 x 4.00 LG. (PUR.)

FOR MG 6557 SC
ADJ. JACK TO HOLD
TRAILING PUMP (PT. # 3-49726)
IN PLACE WHEN PRESSING
BALL BEARINGS INTO MAIN
HOUSING

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER

DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
2	1	T.S.	JACK BUTTON	
1B	1	PUR.	TE-CO STUD PT.# 40706	1/2-13 x 4.00 LG.
1A	1	T.S.	JACK BASE	3.00 DIA. x .50 THK.
1	1		WELDMENT - JACK BASE	

MACHINERY FACTORY

Date: 2-23-98 By: JPL F.P.N.: Scale: FULL

NAME ADJUSTABLE JACK

FOR MG 6557 SC

SHEET 1 OF 1

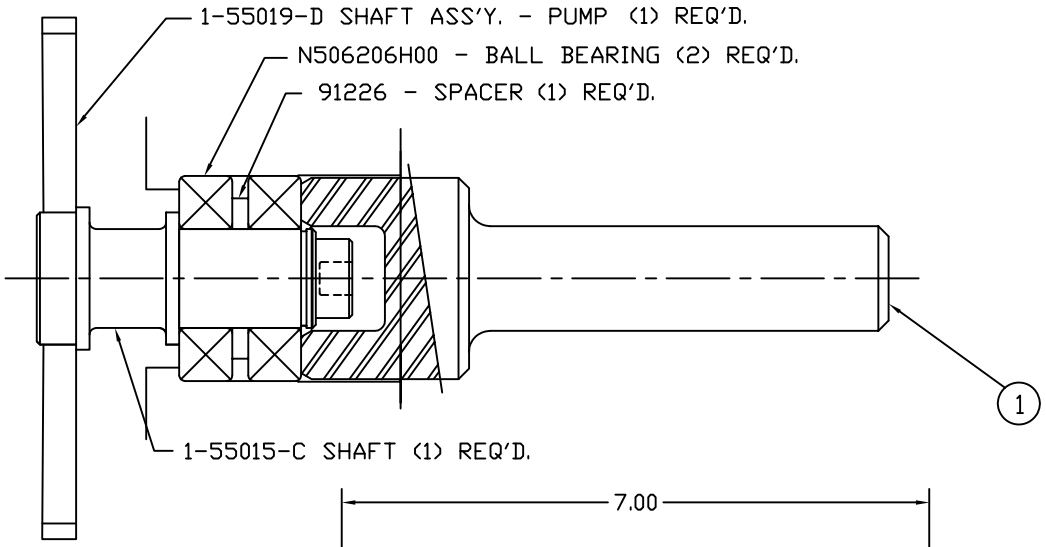
T-21482-44

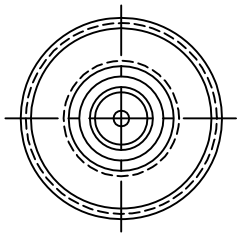
TWIN DISC INC. RACINE, WIS.

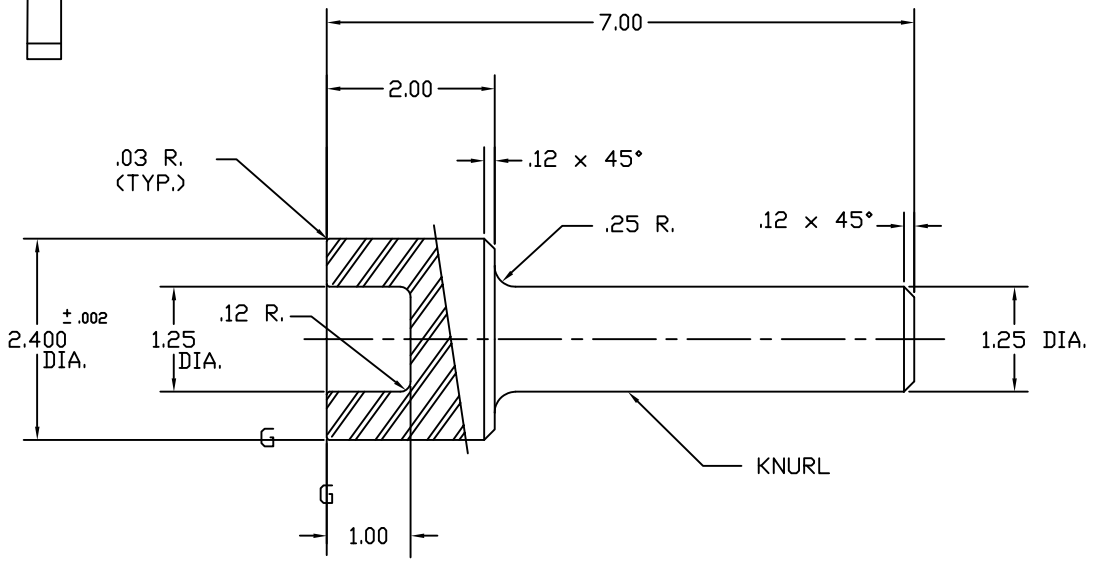
CHANGE	DESCRIPTION	DATE	BY

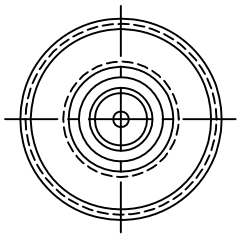
STAMP TOOL NO: T-21482-44
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : 21482-44









FOR MG 6557 SC
INSTALL BALL BEARINGS
#N506206H00 (2) REQ'D.
WITH SPACER 91226
BETWEEN BEARINGS

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

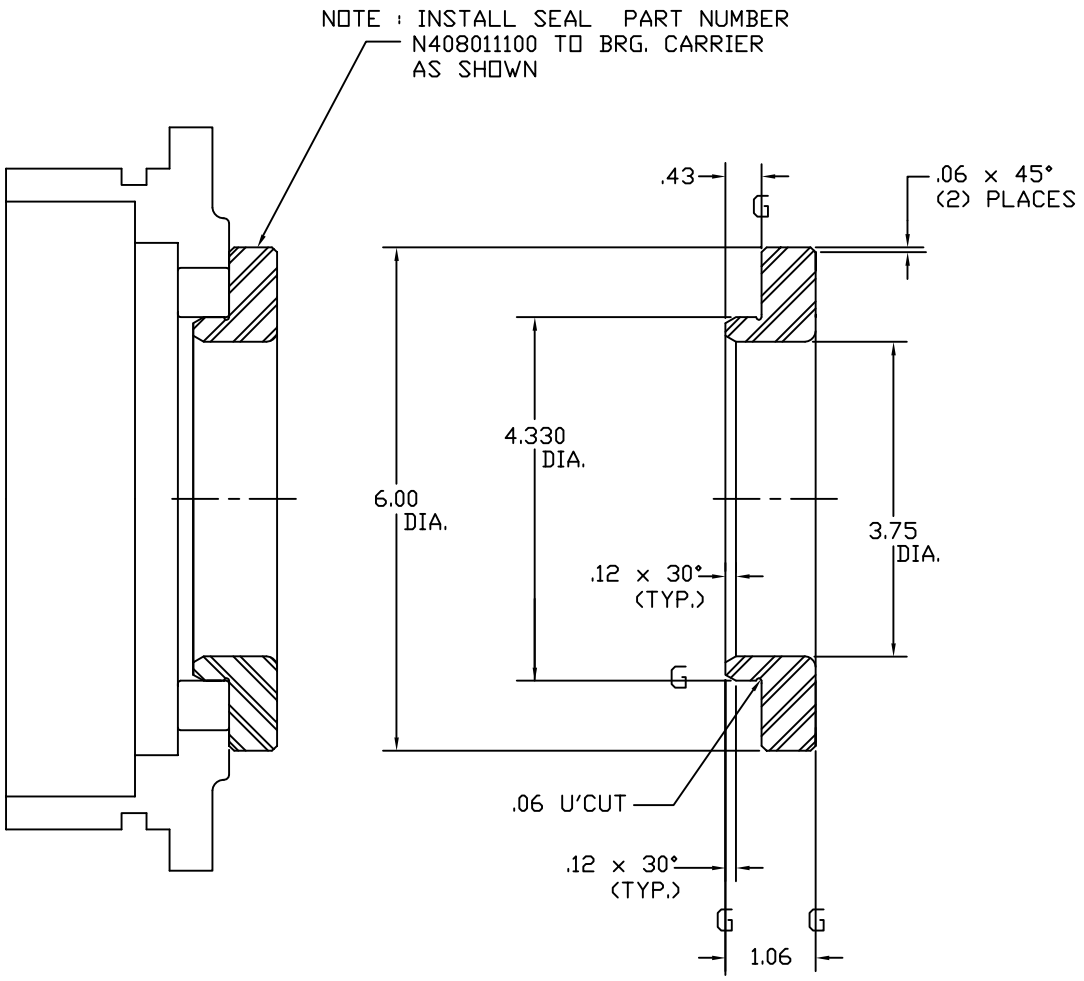
NOTE : ALL GROUND (G) DIA'S. & SURFACES
TO BE SQUARE & CONCENTRIC
WITHIN .005 OF EACH OTHER

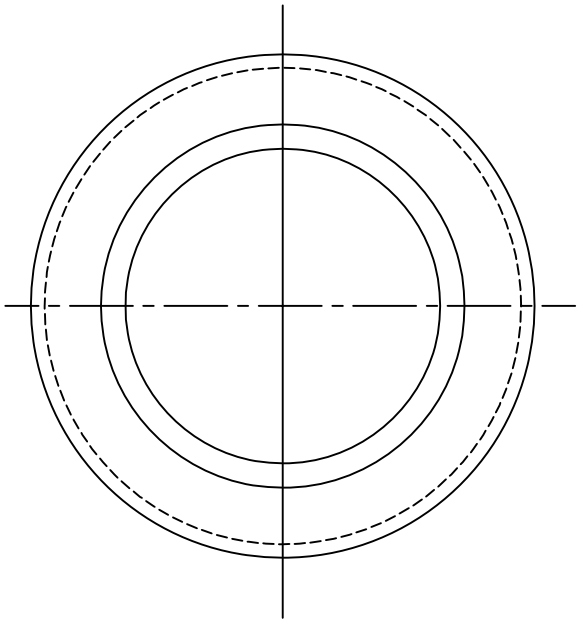
CHANGE	DESCRIPTION	DATE	BY

(CARB. & HDN.)	1	1	T.S.	DRIVER - BEARING	2.25 DIA. x 7.25 LG.
	DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
	Date: 2-23-98		By: JPL	F.P.N.:	Scale: FULL
	NAME: DRIVER - BEARING				
	FOR: MG 6557 SC				SHEET 1 OF 1
	TWIN DISC INC. RACINE, WIS.				T-21482-45

STAMP TOOL NO: T-21482-45
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : 21482-45





FOR MG 6557 SC
INSTALL SEAL :
#N408011100 INTO
INPUT BRG. CARRIER
PART NUMBER 3-49354

NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES TO BE SQUARE & CONCENTRIC WITHIN .005 OF EACH OTHER

(CARB, & HDN.)

1	1	T.S.	DRIVER - SEAL	6.25 DIA. x 1.12 THK.
DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE

Date: 2-21-98 By: JPL F.P.N. Scale: FULL

NAME DRIVER - SEAL

FOR MG 6557 SC

SHEET 1 OF 1

T-21482-46

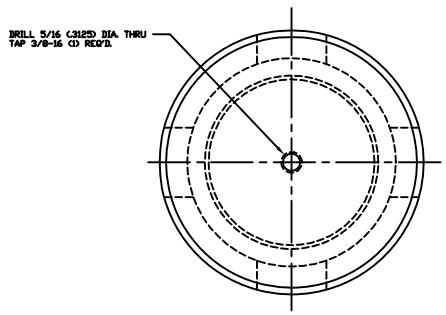
TWIN DISC INC. RACINE, WIS.

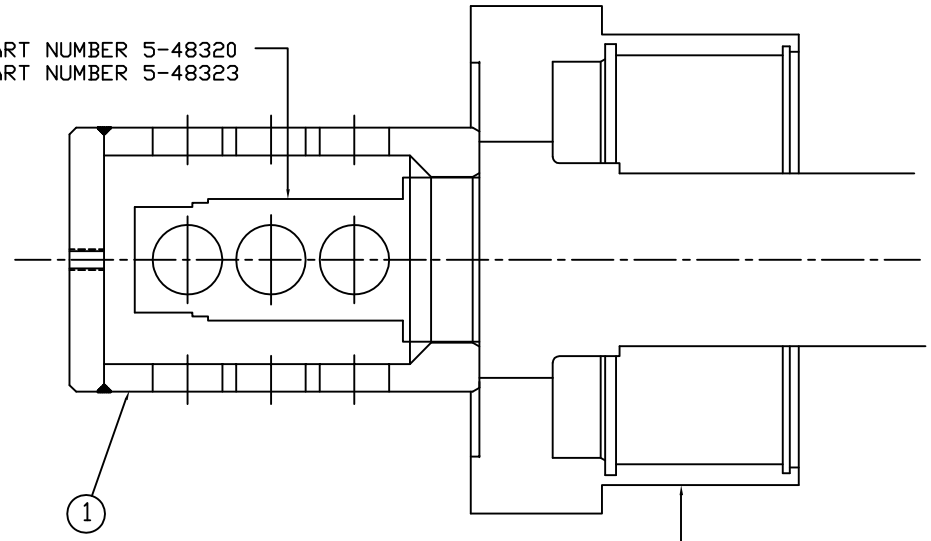
CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-46
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

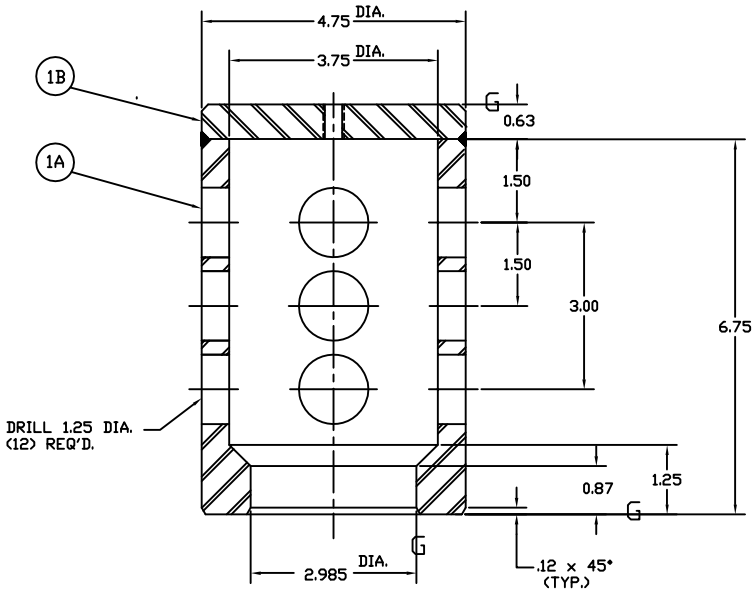
CAD FILE : 214282-46

NOTE : PART NUMBERS -
SHAFT - DRIVE PART NUMBER 5-48320
SHAFT - GEAR PART NUMBER 5-48323





NOTE : PART NUMBERS -
GEAR - DRIVE PART NUMBER 5-48300
GEAR - DRIVEN PART NUMBER 5-46301



1 WELDMENT (1) REQ'D.
SEE DETS. FOR
MAT. & HEAT TREAT

FOR MG 6557 SC
BEARING DRIVER
FOR BOTH FWD. &
REV. CLUTCH BRG. NO'S
N530315000 & N532315000

FOR MG 6557 SC
PRESS PARTS :
5-48300
5-48301
5-48320
5-48323

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) SURFACES MUST BE
PARALLEL WITHIN .005 OF EACH OTHER

(CARB. & HDN.)	1B	1	M.S.	CAP	4.75 DIA. x .75 THK.
(CARB. & HDN.)	1A	1	STEEL TUBE	BODY 4.75 DIA.	x 1.0 WALL x 7.0 LG.
	1	1		WELDMENT	
	DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE

Date 2-20-98 By JPL F.P.No Scale FULL

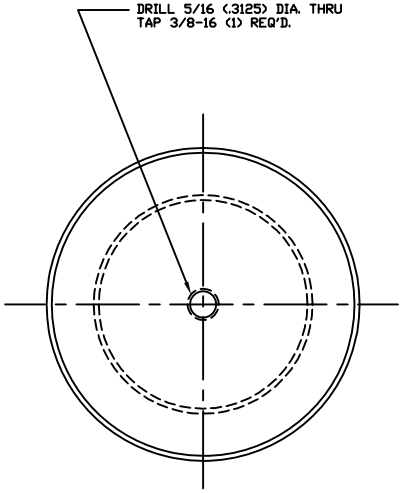
NAME PRESS FIXT.-TRANSFER INTO SHAFT
FOR MG 6557 SC
SHEET 1 OF 1
T-21482-47

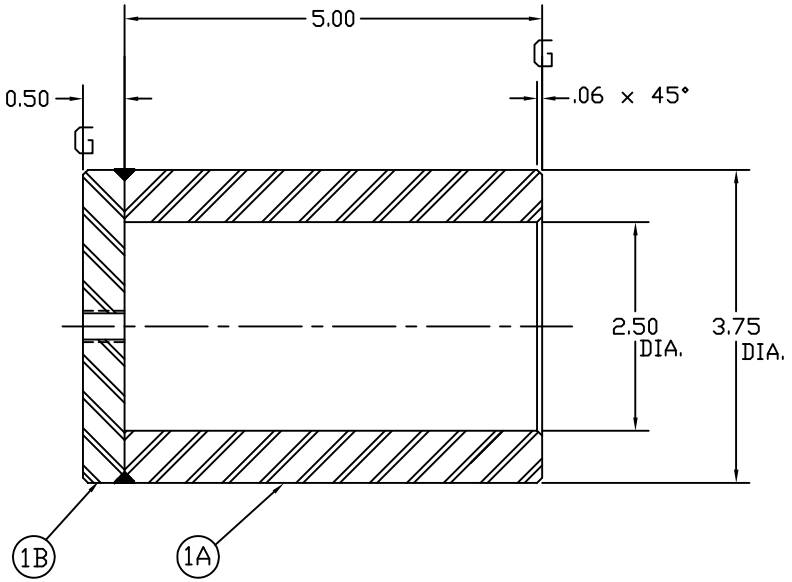
TWIN DISC INC. RACINE, WIS.

CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO- T-21482-47
PART NO- MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.XX IN THREE PLACE DECIMAL DIMENSIONS
.XXX IN FUNCTIONAL AND TWO PLACE
DECIMAL DIMENSIONS
1/4 IN ANGULAR DIMENSION

CAD FILE : 21482-47





(1) WELDMENT (1) REQ'D.
SEE DETS. FOR
MAT. & HEAT TREAT

FOR MG 6557 SC
BEARING DRIVER
FOR BOTH FWD. &
REV. CLUTCH BRG. NO'S
N530315000 & N532315000

NOTE : UNLESS OTHERWISE SPECIFIED,
BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) SURFACES MUST BE
PARALLEL WITHIN .005 OF EACH OTHER

(CARB. & HDN.) 1B	1	M.S.	CAP	3.75 DIA. x .50 THK.
(CARB. & HDN.) 1A	1	STEEL TUBE	BODY 3.75 DIA.	x .62 WALL x 5.12 LG.
1	1		WELDMENT	
DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE

Date: 2-18-98 By: JPL F.P.N.: Scale: FULL

NAME BEARING CONE DRIVER

FOR MG 6557 SC

SHEET 1 OF 1

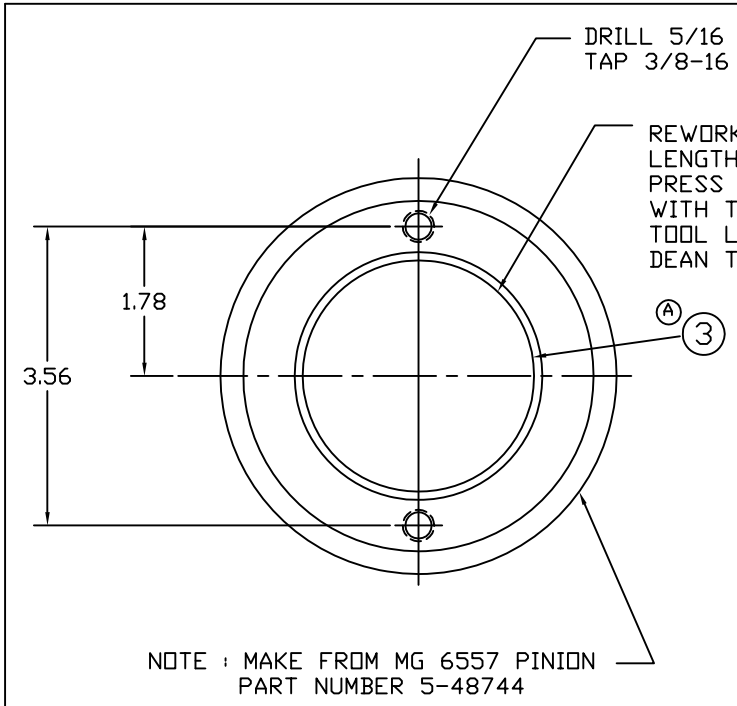
T-21482-49

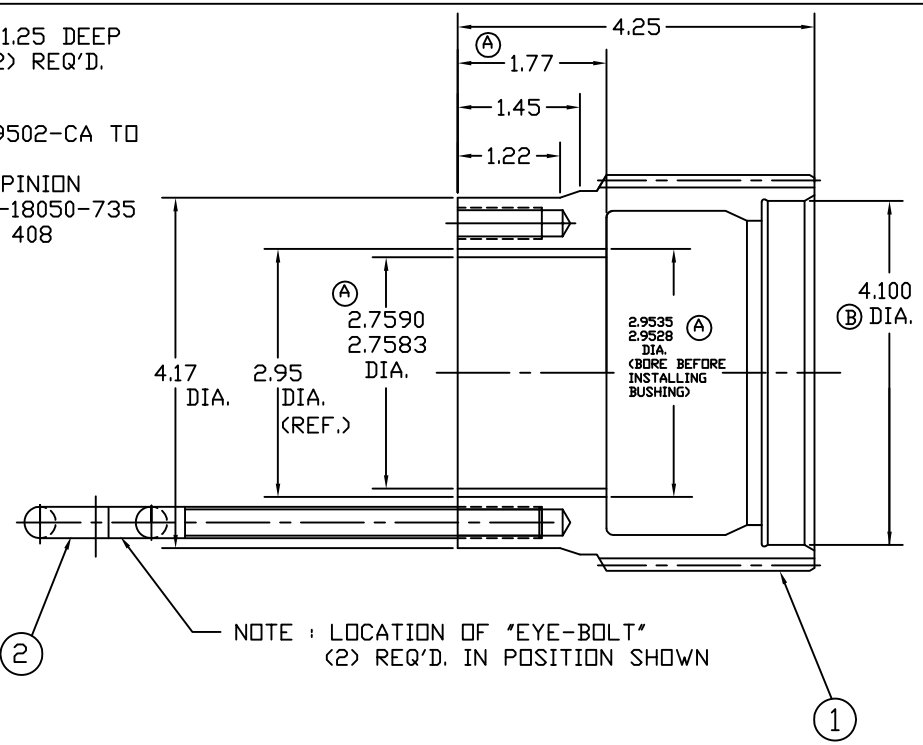
TWIN DISC INC. RACINE, WIS.

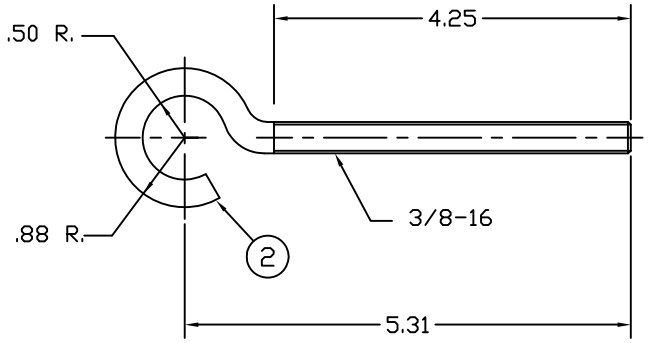
CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-49
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : T-21482-49


DRILL 5/16 (.3125) DIA. x 1.25 DEEP
TAP 3/8-16 x 1.00 DEEP (2) REQ'D.
REWORK BUSHING 1-59502-CA TO LENGTH SHOWN
PRESS BUSHING INTO PINION WITH TOOL NUMBER T-18050-735
TOOL LOCATION DEPT. 408
DEAN TURNER
1.78
3.56
A
3
NOTE : MAKE FROM MG 6557 PINION PART NUMBER 5-48744





FOR MG 6557 SC
MAKE CLUCTH ALINGMENT
TOOL FROM PART NUMBER
5-48744 PINION

A REWORK BUSHING
REWORK PINION

DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
3	1	STK.	PINION BUSHING (MAKE FROM 1-59502-CA)	
2	2	D.R.	EYE-BOLT	.38 DIA. x 7.00 LG.
1	1	STK.	PINION (MAKE FROM #5-48744)	

Date: 2-18-98 By: JPL F.P.N. Scale: FULL

NAME CLUTCH ALINGMENT TOOL

FOR MG 6557 SC

SHEET 1 OF 1

T-21482-50

TWIN DISC INC. RACINE, WIS.

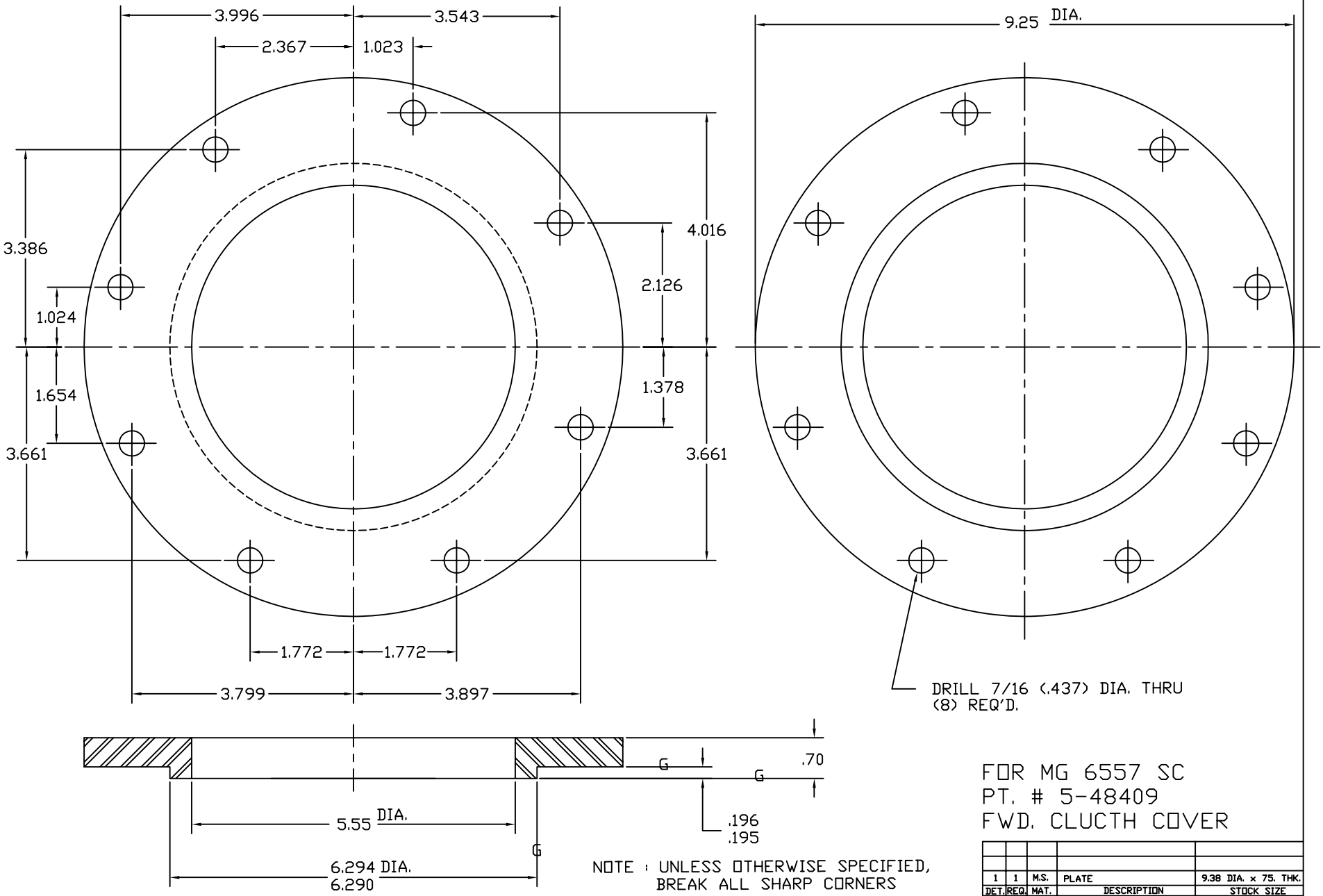
CHANGE	DESCRIPTION	DATE	BY
B	4.100 DIA. ADDED	11-9-98	JPL
A	ADD REVISED BUSHING PART NUMBER 1-59502-CA	10-12-98	JPL

NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES TO BE SQUARE & CONCENTRIC WITHIN .001 OF EACH OTHER

STAMP TOOL NO: T-21482-50
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CAD FILE : 214842-50



NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G)DIA'S. & SURFACES TO BE SQUARE & CONCENTRIC WITHIN .005 OF EACH OTHER

CAD FILE : 21482-51

FOR MG 6557 SC
PT. # 5-48409
FWD. CLUCTH COVER

DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
1	1	M.S.	PLATE	9.38 DIA. x .75. THK.

Date: 2-17-98 | By: JPL | F.P.N.: | Scale: FULL

NAME: FWD. CLUTCH DUMMY PLATE

FOR: MG 6557 SC

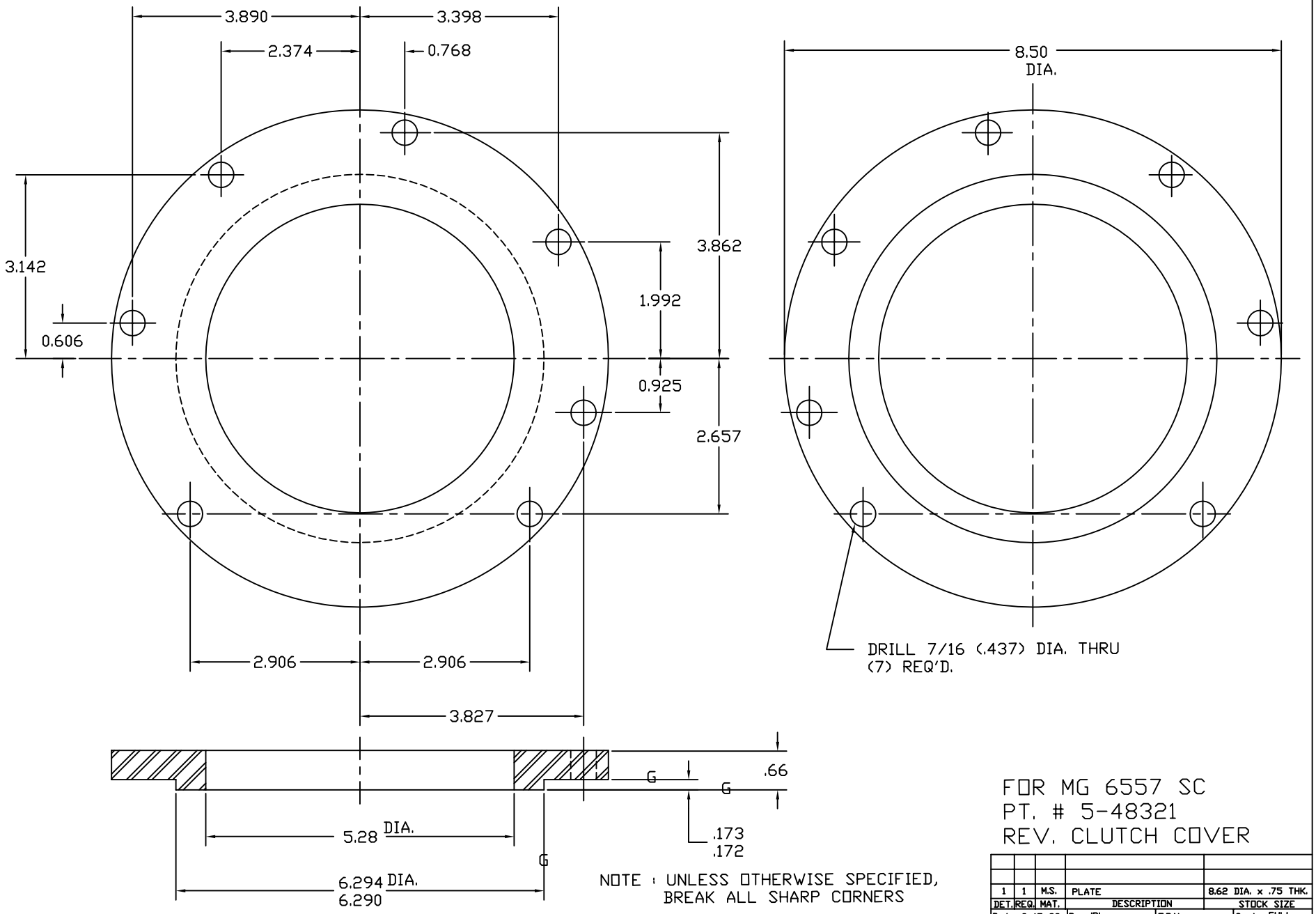
SHEET 1 OF 1

T-21482-51

TWIN DISC INC. RACINE, WIS.

CHANGE	DESCRIPTION	DATE	BY

STAMP TOOL NO: T-21482-51
PART NO: MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION



NOTE : UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP CORNERS

NOTE : ALL GROUND (G) DIA'S. & SURFACES TO BE SQUARE & CONCENTRIC WITHIN .005 OF EACH OTHER

CAD FILE : 21482-52

STAMP TOOL NO. T-21482-52
PART NO. MG 6557 SC
BREAK ALL SHARP CORNERS
TOLERANCE UNLESS OTHERWISE SPECIFIED
.001 ON THREE PLACE DECIMAL DIMENSION
.010 ON FRACTIONAL AND TWO PLACE DECIMAL DIMENSION
1/4 ON ANGULAR DIMENSION

CHANGE	DESCRIPTION	DATE	BY

FOR MG 6557 SC
PT. # 5-48321
REV. CLUTCH COVER

DET.	REQ.	MAT.	DESCRIPTION	STOCK SIZE
1	1	M.S.	PLATE	8.62 DIA. x .75 THK.

Date: 2-17-98 By: JPL F.P.N. Scale: FULL

NAME REV. CLUTCH DUMMY PLATE

FOR MG 6557 SC

SHEET 1 OF 1

TWIN DISC INC. RACINE, WIS.

T-21482-52

Engineering Drawings

List of Engineering Drawings

The following pages include the engineering drawings that are specific to this model. The engineering drawings included are listed below and continued on the following page.

Note: Any part numbers listed in the following engineering drawings are for reference only. Please refer to your bill of material for part numbers specific to your model.

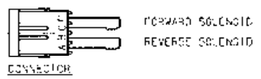
- ❑ 736628 Marine Transmission, General View
- ❑ 736628A Marine Transmission, General View
- ❑ 738228B Marine Transmission, General View
- ❑ 738229 Marine Transmission, Sectional View
- ❑ 737634 Marine Transmission, General View
- ❑ 737635 Marine Transmission, Sectional View
- ❑ 737934 Marine Transmission, General View
- ❑ 737265 Marine Transmission, General View
- ❑ 737266 Marine Transmission, Sectional View
- ❑ 737893 Marine Transmission, General View
- ❑ 737894 Marine Transmission, Sectional View
- ❑ 549341 Marine Transmission, Sectional View
- ❑ 737966 Marine Transmission, Sectional View
- ❑ A7119W Hydraulic Diagram, Electric Valve
- ❑ 349460 Hydraulic Schematic, Transmission

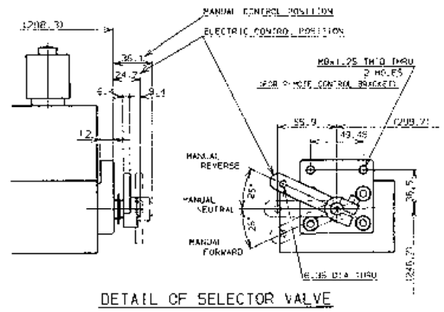
❑	1018084	Valve Assembly - Control (without trolling valve)
❑	1020025	Valve Assembly, Trolling
❑	168753G	Valve Assembly, Trolling
❑	549091	Pump Assembly (trailing)
❑	737004A	Live Pump Mount Power Take-off
❑	737064B	Clutchable Pump Mount Power Take-off

DD-6557A MARINE GEAR SPECIFICATIONS						
GEAR RATIO	1.25	1.51	1.74	2.03	2.48	2.92
BOM. NO.	40437	40438	40439	40440	40441	40442
TOTAL WEIGHT	APPROX. 420 kg (DRY) EXCLUDING FLEXIBLE COUPLING					
OIL QUANTITY	APPROX. 20 L					
OIL PRESSURE	CLUTCH OIL 23-25 kgf/cm² AT RATED ENGINE SPEED					
	LUBE OIL 2.6 kgf/cm² OIL TEMP. 65-70°C					
OIL VISCOSITY	SAE #40 (DON'T USE MULTI-GRADE OIL)					
OIL & GREASE CHANGE INTERVAL	THE FIRST OIL CHANGE AT 100 HOURS OF OPERATION AND SUBSEQUENTLY EVERY 1000 HOURS OF OPERATION					
SHIFTING LEVER EFFORT	30kgf-cm MAX.					
STRAINER	WIRE NETTING					
SHIFTING RESTRICTION	SHIFT TO FORWARD OR REVERSE FROM NEUTRAL AND SHIFT ACROSS NEUTRAL SHALL BE MADE AT ENGINE SPEED LOWER THAN 50% OF THE RATED SPEED					
HEAT EXCHANGER	WATER FLOW (RAW WATER) 60-90 L/min.					
	TEMPERATURE OF COOLING WATER 32 °C MAX.					

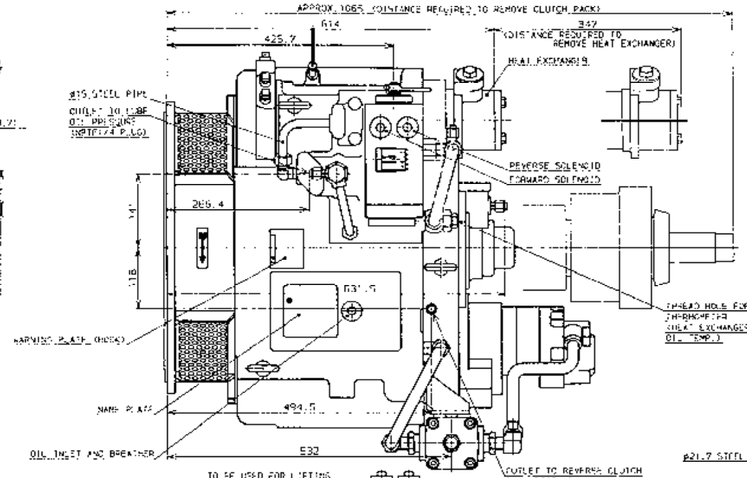
SECTIONAL VIEW DWG NO.	5 4941
BILL OF MATERIAL NO.	SEE TABLE
GEAR PUMP TOOTH WIDTH	42mm

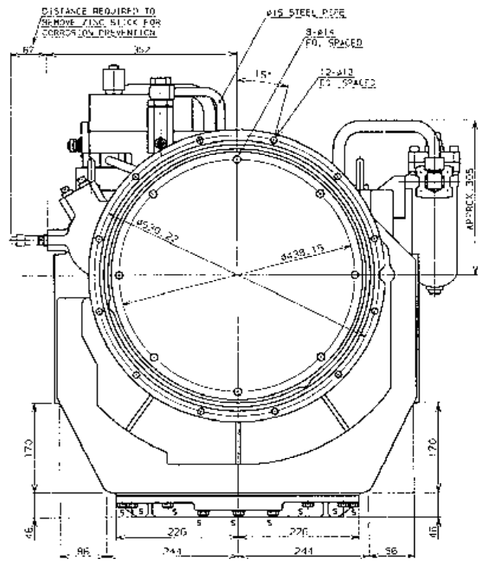
WIRING DIAGRAM
(OPERATING VOLTAGE : 24VDC)

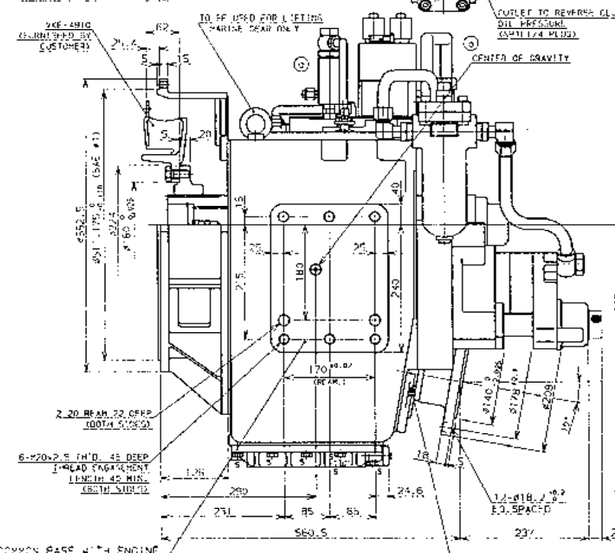


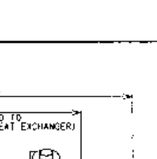


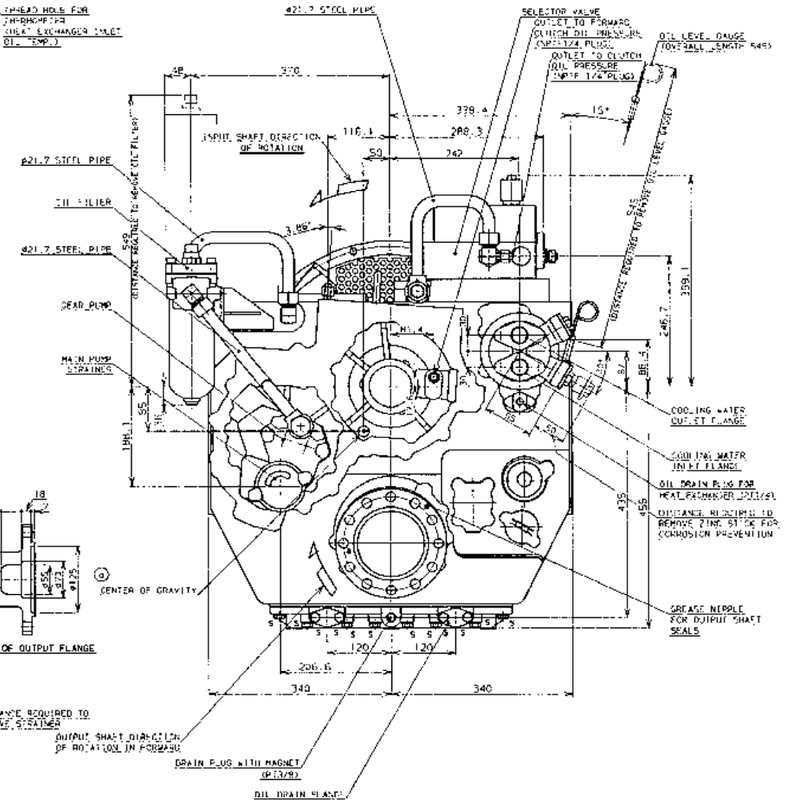
DETAIL OF SELECTOR VALVE



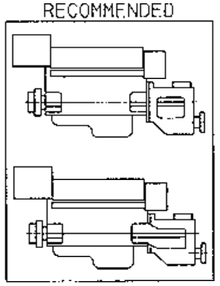



TO BE USED FOR LIFTING MARINE GEAR ONLY
CENTER OF GRAVITY
2-20 BEAM, 22 DEEP (DEPTH 5 1/8 SQ)
6-M20x2.5 TH'D, 45 DEEP
FULL THREAD ENGAGEMENT LENGTH 45 MIN. (BOTH SIDES)
GREASE DRAIN PLUG

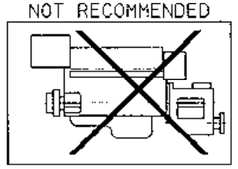



ø21.7 STEEL PIPE
SELECTOR VALVE OUTLET TO FORWARD CLUTCH OIL PRESSURE (NPTF1/4 PLUG)
OUTLET TO CLUTCH OIL PRESSURE (NPTF 1/4 PLUG)
OIL LEVEL GAUGE (TOPBALL ENGTH 545)
INPUT SHAFT DIRECTION OF ROTATION
OIL FILTER
GEAR PUMP
MAIN PUMP STRAINER
COOLING WATER OUTLET FLANGE
COOLING WATER INLET FLANGE
OIL DRAIN PLUG FOR HEAT EXCHANGER (PT3/8)
GREASE NIPPLE FOR OUTPUT SHAFT SEALS
OUTPUT SHAFT DIRECTION OF ROTATION IN FORWARD
DRAIN PLUG WITH MAGNET (PT3/8)
OIL DRAIN FLANGE

RECOMMENDED



NOT RECOMMENDED



OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE

ⓐ WHEN MOUNTING ENGINE/TRANSMISSION IN BOAT, ALL THE MOUNTING PADS ON THE ENGINE MUST BE USED - PLUS THE TRANSMISSION SIDE MOUNTING PADS. FAILURE TO DO SO MAY RESULT IN DAMAGE TO TRANSMISSION. SEE BELOW:

MOUNT THE UNIT ON A COMMON BASE WITH ENGINE AFTER LOCATING BRACKETS WITH PINS

REV	BY	APPD.
0	I.NAKAJIMA	

REV	ZONE	CH. NO.	DATE
0	D4	M09687	970610

REV	ZONE	CH. NO.	DATE

NOTICE: THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO MODIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

METRIC
THIRD ANGLE PROJECTION
SIMILAR TO

MATERIAL ----
HEAT TREAT ----
SURFACE TREATMENT ----

WEIGHT ---- kg
SCALE ----

FIRST USE
MODEL DD-6557A
NAME GENERAL VIEW

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS
X ±0.50
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

DATE 4-2-97
SCALE 1:5
DRN. K. Sakurai
DES. S. Takeuchi
APPD. T. Tanimura

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

97-36628

SHEET 1 OF 1 REV A

MG-6557-DC-A MARINE GEAR RECTIFICATIONS	
GEAR RATIO	1.39 1ST, 1.77 2ND, 2.42 2.48 2.22
TOTAL WEIGHT (DRY)	APPROX. 420 (190) EACH, WITH 3 FLEXIBLE MOUNTING
OIL CAPACITY	APPROX. 23
OIL PRESSURE AND SUMP TEMP	CLUTCH OIL 21-25 (145-170) AT NORMAL RATED ENGINE RPM. 65-85°C (150-185°F) MAXIMUM. SUMP OIL 65-85°C (150-185°F) MAXIMUM. SAE #30 (ABOVE 10°F) OR MULTI-GRADE OILS
OIL & SPACER CHANGE INTERVAL	THE FIRST OIL CHANGE AT 100 HOURS OF OPERATION AND SUBSEQUENT CHANGES EVERY 1000 HOURS OF OPERATION
SHIFTING POWER REQUIRED	20 KGF (44 LBS) MAX.
STRAINER	MAIN SUCTION
SHIFTING RESTRICTION	SHIFT TO FORWARD OR REVERSE FROM NEUTRAL AND SHIFT ACROSS NEUTRAL SHALL BE MADE AT ENGINE SPEED LOWER THAN 50% OF THE RATED SPEED.
HEAT EXCHANGER	WATER FLOW (RAW WATER) 60 (16) L/MIN (GPM) TEMPERATURE OF INCOMING WATER 32 °C (90 °F) MAX.
SPECIFICATION NUMBER	5-8411
GEAR MODEL NUMBER	422RB

DETAIL OF SELECTOR VALVE

WIRING DIAGRAM
OPERATING VOLTAGE 12 VOLTS
FORWARD SOLENOID
REVERSE SOLENOID
COMMON

DETAIL OF OUTPUT FLANGE

OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

REV	ZONE	CH. NO.	DATE
C	7B	MC-6255	12-15-97
B	7B	MC-6218	12-11-97
A	8A	MC-6184	9-11-97

MATERIAL ---
HEAT TREAT ---
FINISH ---
NEXT ASSY ---
FIRST USE ASSY. MODEL MG-6557-DC-A
NAME GENERAL VIEW

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [MILLIMETERS] X ±0.06 [1.5] .XX ±0.03 [0.8] .XXX ±0.010 [0.25] ALL ANGLES TOLERANCES ±1° SEPARATE FOR SAME DIM PER ANSI Y14.5M-1982

METRIC
THIRD ANGLE PROJECTION
SIMILAR TO

DATE 5-12-97
SCALE 1:6
DRN. [illegible]
CH'D [illegible]
APP'D [illegible]

TWIN DISC INCORPORATED RACINE, WISCONSIN USA

7-36620-A
SHEET 1 OF 1 REV. C

MG-6557-00-A MARINE GEAR SPECIFICATIONS	
GEAR RATIO	1.49 1.87 2.03 2.48 2.82
TOTAL PASS	APPROX. 408 kg (900 LBS) FOR LONGER FLEXPLATE COUPLING
OIL QUANTITY	APPROX. 18 L (4.75 GAL)
OIL PRESSURE	CLUTCH OIL: 2.5 - 2.7 kg/cm² (36 - 38 PSI) @ 1000 RPM OIL OUT: 0.7 - 0.8 kg/cm² (10 - 12 PSI) @ 1000 RPM
OIL VISCOSITY	SAE #40 (MULTI GRADE OILS TO MIL-L-2104D/E)
OIL & GREASE CHANGE INTERVAL	THE FIRST OIL CHANGE AT 50 HOURS OF OPERATION AND SUBSEQUENTLY EVERY 1000 HOURS OF OPERATION
SHIFTING LEVER EFFORT	6.4 kg (14 LBS) MAX.
STRAINER	125 MESH
SHIFTING PROTECTION	SHIFT TO FORWARD OR REVERSE FROM NEUTRAL
HEAT EXCHANGER	MOLDED SHELL SHALL BE MADE OF STAINLESS STEEL, NOT LESS THAN 6% OF THE RATED SPEED
	WATER FLOW (RAW WATER) 83 (22 L/M) @ TEMPERATURE OF COOLING WATER 32° TO MAX.

REVERSE VIEW SHOWN	7 (Max)
CLEAR PUMP WIDTH MORE	12mm

DETAIL OF SELECTOR VALVE

OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE

DETAIL OF OUTPUT FLANGE

METRIC

THIRD ANGLE PROJECTION

SIMILAR TO

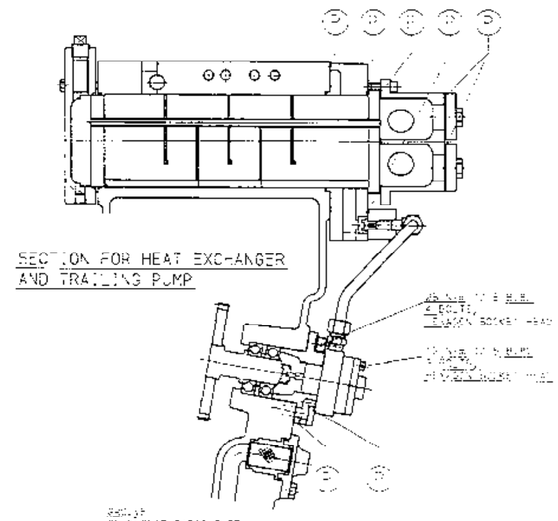
NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO MODIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL	
HEAT TREAT	
SURFACE TREATMENT	
FINISH	XXXX Kg
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS	X = ±0.5 (0.02) XX = ±0.25 (0.01) XXX = ±0.13 (0.005)
ALL ANGULAR TOLERANCES ±1° GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982	
NEXT USE ASSY. MODEL MG-6557-00-A	
NAME	GENERAL VIEW
DATE	2/26/13
SCALE	1:6
DRN.	
ENG.	
APPD.	
SHEET 1 OF 1	REV.

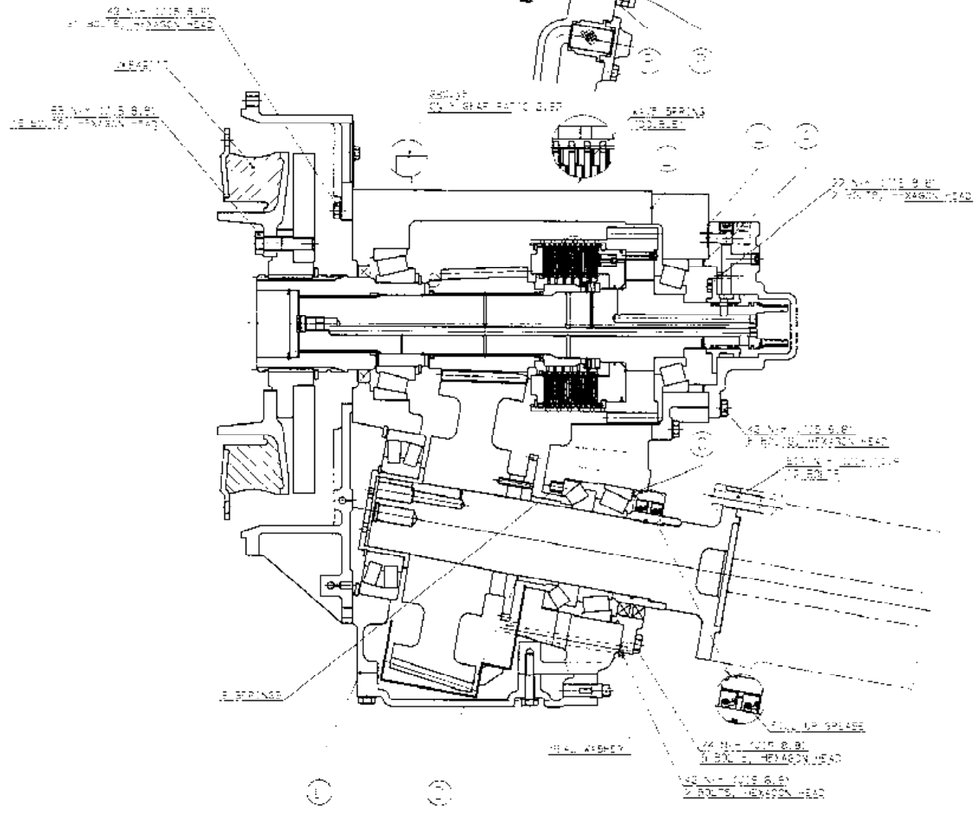
TWIN DISC INCORPORATED RACINE, WISCONSIN - USA

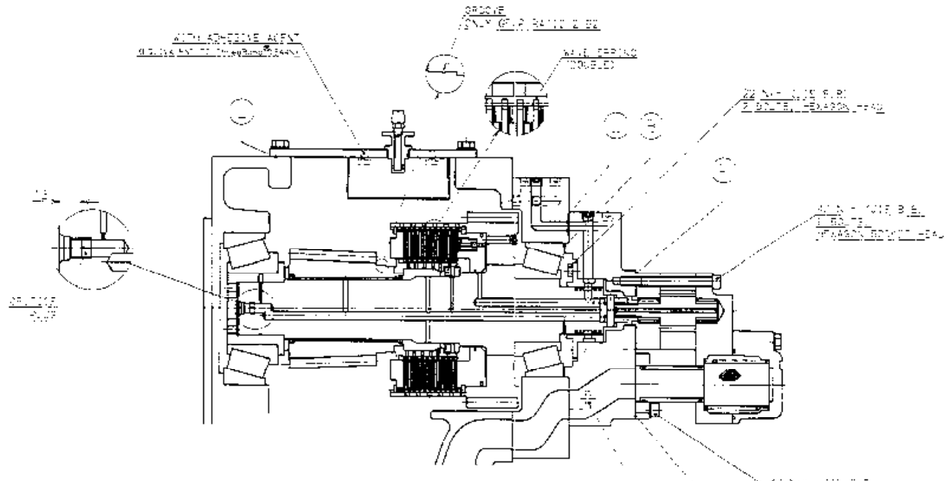
7-38228-3

(A1.1)

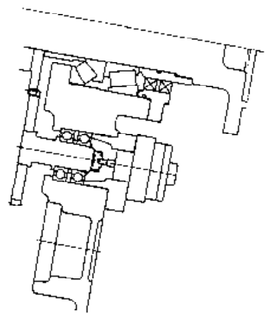


SECTION FOR HEAT EXCHANGER AND TRAILING PUMP





SECTION FOR REVERSE SHAFT & MAIN PUMP



SECTION FOR PUMP DRIVE GEAR

NOTES

METRIC

THIRD ANGLE PROJECTION

SIMILAR TO

7-37956

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO QUALIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL -

HEAT TREAT -

SURFACE TREATMENT -

FINISH ---

WT. ---

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS

X	±0.25
X.X	±0.25
X.XX	±0.13

ALL ANGULAR TOLERANCES ±1° GEOMETRIC TOLERANCING PER ANSI Y14.5M-1982

DATE 10-24-00

SCALE 1=1.5

DRN. P. HAYWARD

CHK. [illegible]

APP. [illegible]

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

7-38229

SECTIONAL VIEW

SHEET 1 OF 1 REV ---

A1

DETAIL OF SELECTOR VALVE

DETAIL OF PTO MOUNT
(SAE J744 SIZE "C")

VIEW A

OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE

DETAIL OF OUTPUT FLANGE
(SCALE 1:4)

RECOMMENDED

NOT RECOMMENDED

NOTICE: THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF "WIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

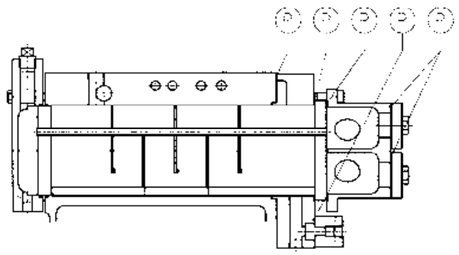
METRIC
THIRD ANGLE PROJECTION

GENERAL VIEW

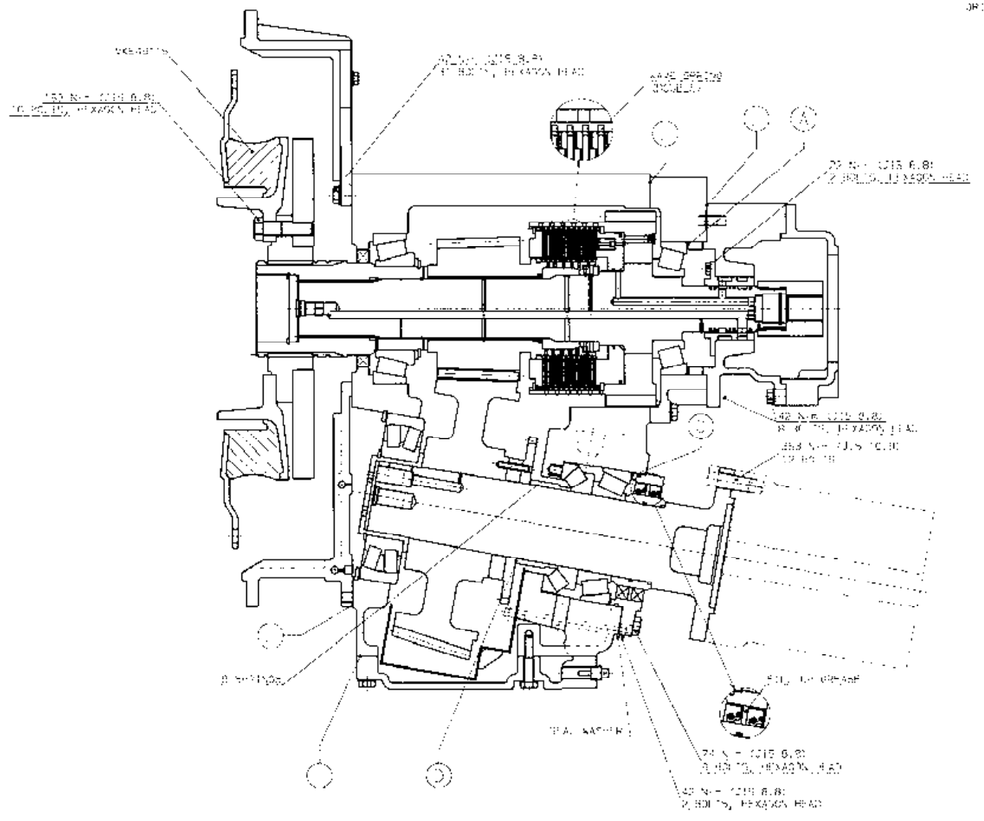
TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

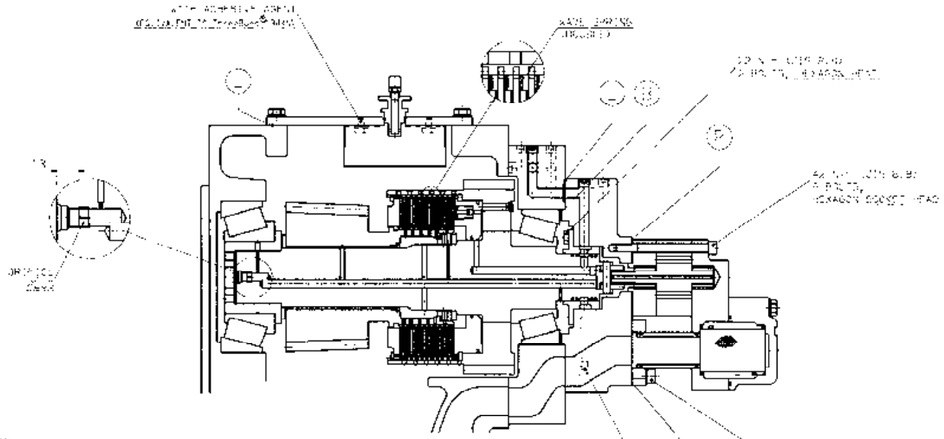
7-37634

SHEET 1 OF 1

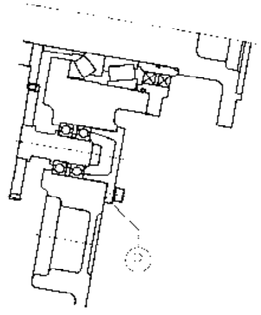


SECTION FOR HEAT EXCHANGER

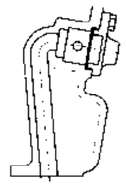




SECTION FOR REVERSE SHAFT & MAIN PUMP



BLIND COVER FOR WITHOUT TRAILING PUMP



BLIND COVER FOR WITHOUT OIL STRAINER

NOTES

METRIC

THIRD ANGLE PROJECTION

SIMILAR TO

REV	BY	APPD.	REV	ZONE	CH. NO.	DATE	REV	ZONE	CH. NO.	DATE
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA. THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL

HEAT TREAT

SURFACE TREATMENT

WEIGHT — kg — lbs

FIRST USE

ASSY.

MODEL MG-6557-OD-A

NAME

SECTIONAL VIEW

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS

X	±0.75
X.X	±0.25
X.XX	±0.13

ALL ANGULAR TOLERANCES ±1° GEOMETRIC TOLERANCING PER ANSI Y14.5M-1982

DATE 12-19-00

SCALE 1:2

DRN.

CHK.

APPD.

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

7-37635

SHEET 1 OF 1 REV

A1T

MG 6557 CC A MARINE GEAR SPECIFICATIONS	
RAMP RATIO	1.28 : 1.5 : 1.74 : 2.01 : 2.38 : 2.92
RPM RANGE	APPROX. 420 (@50Hz) EXCLUDING FLEXIBLE COUPLING
OIL QUANTITY	APPROX. 18
OIL PRESSURE	CLUTCH OIL PRESSURE: 2.5 - 3.5 KPA (0.25 - 0.35 BAR) (3.6 - 5.1 PSI) AT 1200 RPM LUBE OIL PRESSURE: 0.2 - 0.6 KPA (0.02 - 0.06 BAR) (2.9 - 8.7 PSI) AT 1200 RPM
OIL VISCOSITY	SAE #30 SHORT CRUISE (ALL TO 100° APPROVED)
OIL & GREASE CHANGE INTERVAL	THE FIRST OIL CHANGE AT 100 HOURS OF OPERATION AND THEREAFTER EVERY 1000 HOURS OF OPERATION
ROTATION FROM PILOT	CLOCKWISE
OPERATING SPECIFICATION	EMPLOYMENT: SHIFT TO FORWARD OR REVERSE FROM NEUTRAL AND SHIFT ACROSS NEUTRAL SHALL BE MADE AT ENGINE SPEED UNDER HALF RPM OF THE RATED SPEED
HEAT EXCHANGER	WATER FLOW (RAW WATER): 20 LPM TEMPERATURE OF COOLING WATER: 32° TO 90° MAX

SECTIONAL VIEW SHOWN	1 (CW)
GEAR RATIO (CW ROTATION)	1.74:1

DETAIL OF SELECTOR VALVE

DETAIL OF OUTPUT FLANGE

OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE

NOTE
MARKED S.S.N.A.B. STAINLESS STEEL BOLTS

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL ---
HEAT TREAT ---
SURFACE TREATMENT ---

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS
X. ±0.75
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

DATE 2/26/2
SCALE 1:4
DRN. [illegible]
CHK. [illegible]
APPD. [illegible]
SHEET 1 OF 1 REV ---

MFTRIC
THIRD ANGLE PROJECTION
SIMILAR TO

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

7-37934-A

GENERAL VIEW

REV	BY	APPD.	REV	ZONE	CH. NO.	DATE	REV	ZONE	CH. NO.	DATE
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	

A1T

HYDRAULIC PTO PUMP DRIVE SPECIFICATIONS		
OIL RECOMMENDED	C.I.C.P. OIL IS 32 cSt/40°C	
PTO CAPACITY	MAXIMUM TORQUE INPUT	
	OPERATING SPEED FOR 1500 r/min	
	SHAFT ROTATION, VIEWED AT PTO SHAFT	CLOCKWISE, RECTION
	ADAPTER SAE J744 SIZE	
	CLOCKWISE MOUNTED PUMP	
SPLINE DATA	SAE	J744
	NO. OF TEETH	
	MAJOR DIA.	
	PITCH DIA.	
	PRESS. ANGLE	
	MAJOR DIA.	
	MINOR DIA.	

YD 8557-06-A MARINE GEAR SPECIFICATIONS	
GEAR RATIO	
TOTAL WEIGHT	APPROX. 480 kg DRY
	EXCLUDING FLEXIBLE COUPLING AND PROPELLER FLANGE
OIL CAPACITY	APPROX. 25
OIL PRESSURE	
OIL RECOMMENDED	
OIL FILTER ELEMENT	
OIL COOLER	
SHIFTING LEVER POSITION	
SHIFTING	
HEAT EXCHANGER	

DETAIL OF SELECTOR VALVE

DETAIL OF PTO MOUNT
(SAE J744 SIZE "C")

VIEW A

RECOMMENDED

NOT RECOMMENDED

OIL DRAIN FLANGE

COOLING WATER, INLET AND OUTLET FLANGE

DETAIL OF OUTPUT FLANGE
(SCALE 1:4)

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 USA
THIS NOTICE IS NOT INTENDED TO MODIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

REV	BY	APPD.

REV	ITEM	CH. NO.	DATE

REV	ZONE	CH. NO.	DATE

MATERIAL

HEAT TREAT

SURFACE TREATMENT

PARTS USE

ASSY.

MODEL HG-6557-06-A

NAME GENERAL VIEW

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MM
MACHINED DIMENSIONS
X ±0.5
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

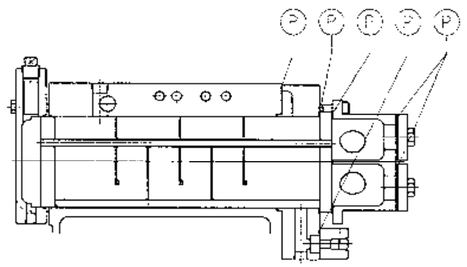
METRIC
THIRD ANGLE PROJECTION
SIMILAR TO

TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

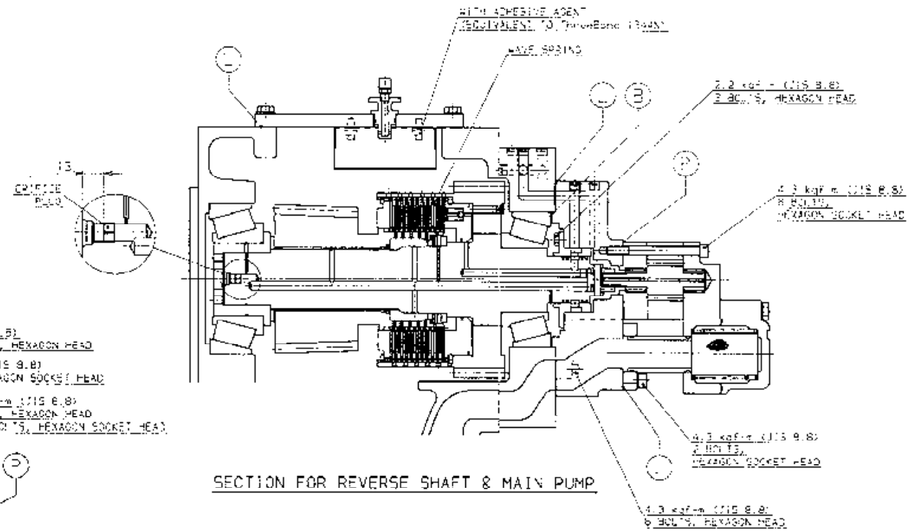
7-37265-A

SHEET 1 OF 1 REV

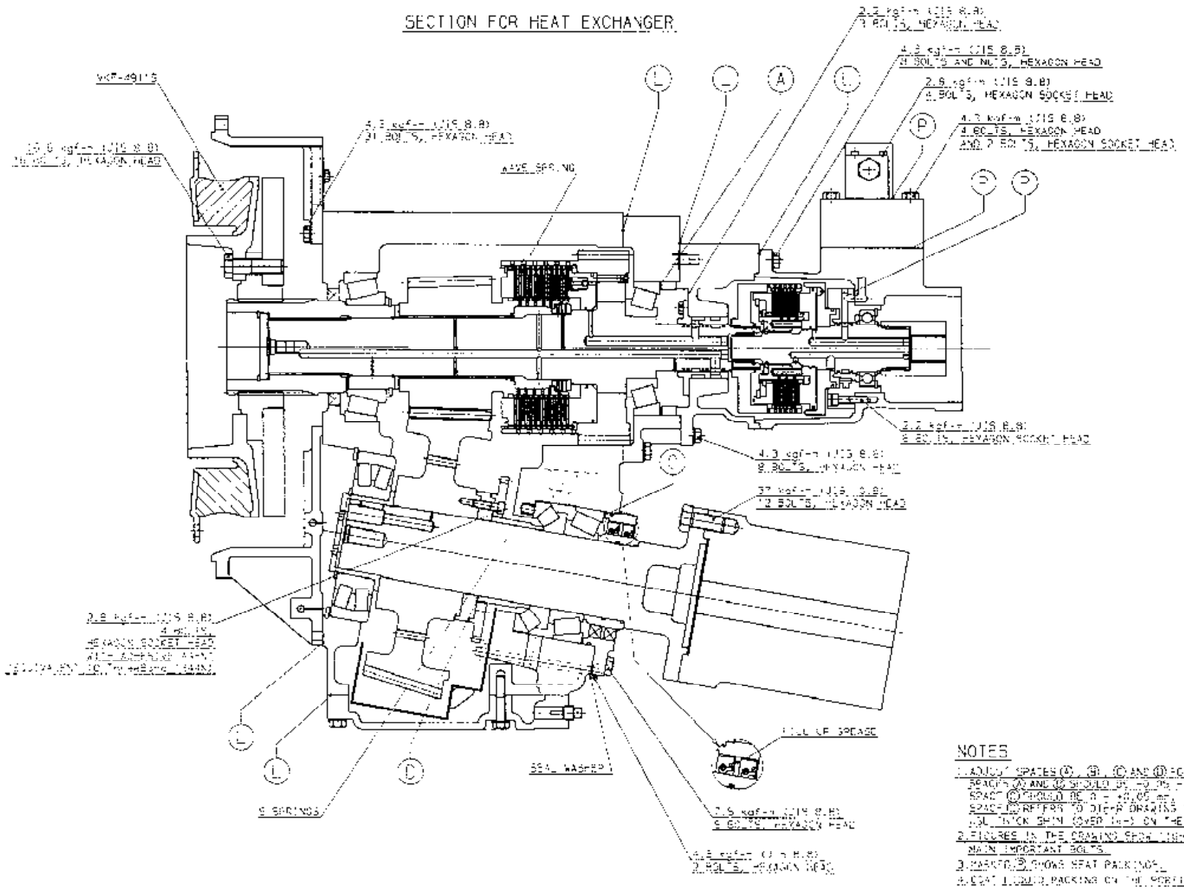
A1T

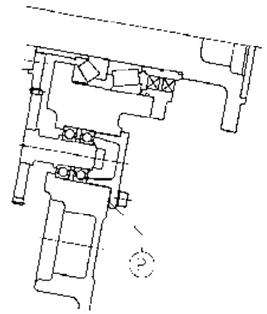


SECTION FOR HEAT EXCHANGER

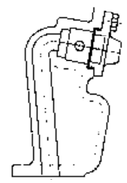


SECTION FOR REVERSE SHAFT & MAIN PUMP





BLIND COVER FOR WITHOUT TRAILING PUMP



BLIND COVER FOR WITHOUT OIL STRAINER

NOTES

1. ADJUST SPACERS ⓐ, ⓑ, ⓒ AND ⓓ FOR EACH SHAFT WITH SHIMS.
   SPACER Ⓐ AND Ⓑ SHOULD BE 0.2 ~ 0.3 mm.
   SPACER Ⓒ SHOULD BE 0 ~ +0.05 mm.
   SPACER Ⓓ REFER TO DIESEL DRAWING 5-8948S.
   (ALL SHIM SHIM COVER (+) ON THE SIDE OF SPACER IS THERE IS A GROOVE).
2. FIGURES IN THE DRAWING SHOW TIGHTENING TORQUE FOR MAIN IMPORTANT BOLTS.
3. MARKED Ⓟ SHOWS SEAT PARTICIPATE.
4. COAT LIQUID PACKING ON THE PORTION MARKED Ⓒ AND ASSEMBLE THEM.

REV	BY	APPD.

REV	ZONE	CH. NO	DATE	REV	ZONE	CH. NO	DATE

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO MODIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL

HEAT TREAT

SURFACE TREATMENT

NEXT ASSY.

MODEL MG-8557-00-A

NAME SECTIONAL VIEW

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS
X ± 1(0.5)
X.X ± 0.25(0.13)
X.XX ± 0.13(0.1)
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M-1982

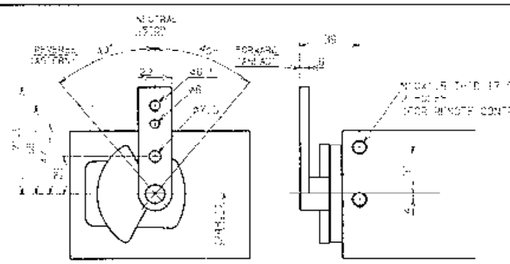
DATE 2-18-98
SCALE 1:3
DRN. T. CHAMBERLAIN
CHK. K. Shimm
APPD. T. Jacobsen

TWIN DISC INCORPORATED RACINE, WI 53403 • USA

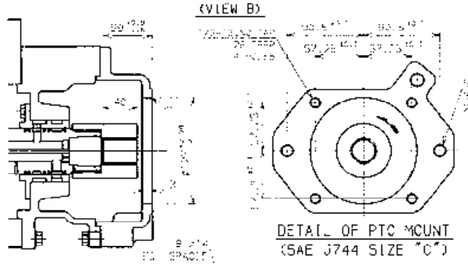
7-37266

SHEET 1 OF REV

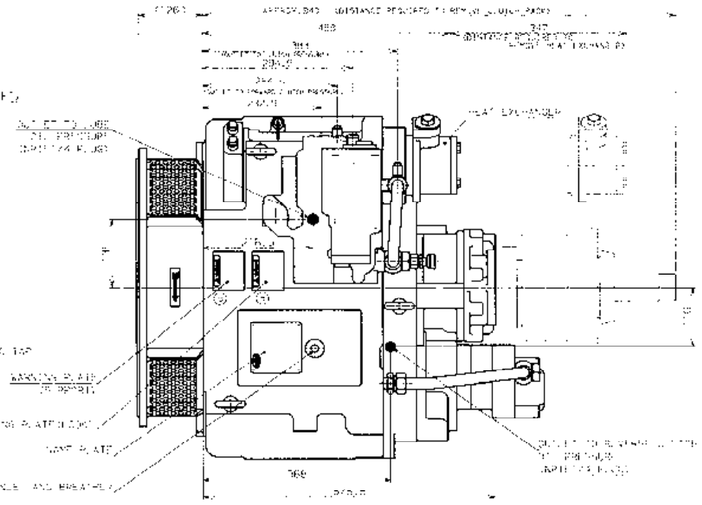
METRIC
THIRD ANGLE PROJECTION



DETAIL OF SELECTOR VALVE
(VIEW B)

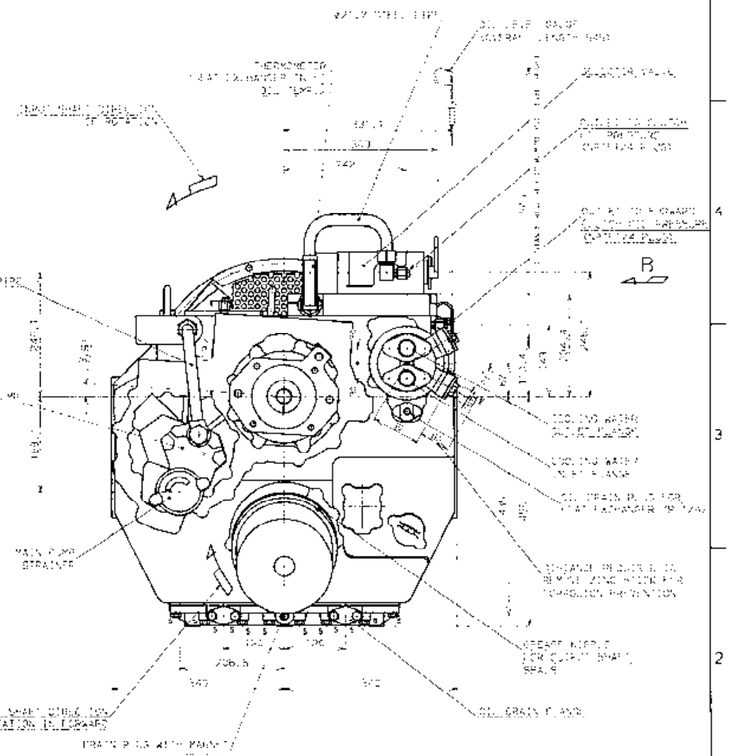


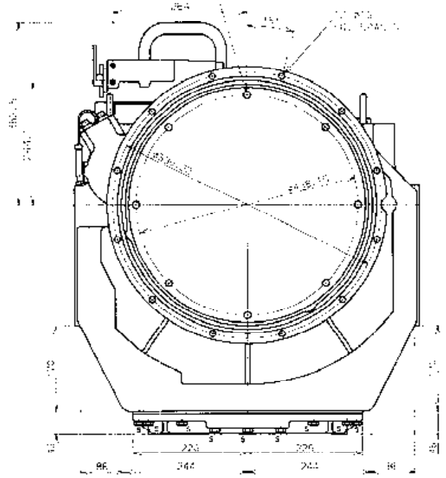
DETAIL OF PTC MOUNT
(SAE J744 SIZE "C")



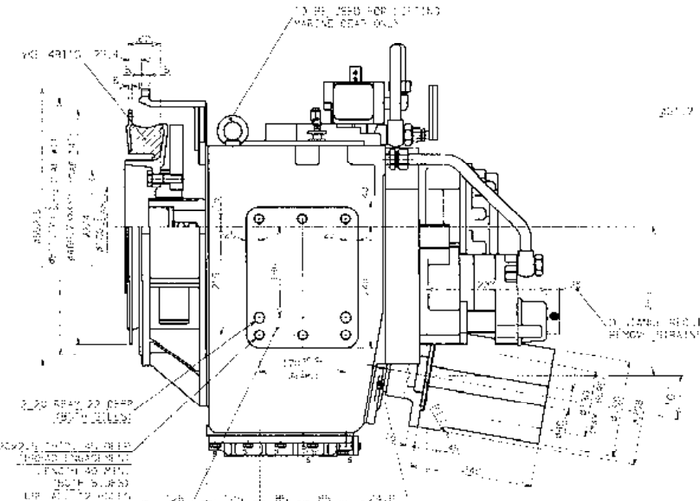
HYDRAULIC PTO PUMP DRIVE SPECIFICATIONS	
PTO CAPACITY	MAPPING SPEED RPM MAX. OPERATING SPEED 600-1800 RPM SHAFT ROTATION REAR END VIEW OF PUMP ACCEPTS SAE J744 SIZE "C" 8 SPL
PILOT DATA	GP NO. OF TEETH MINIMUM PITCH DIA. (REF) PRESS. ANGLE FIT MAJOR DIA. ARC TOOTH SPACE

MG 6154-00-A MARINE GEAR SPECIFICATIONS	
GEAR RATIO	
PTO MASS	
OIL CAPACITY	
OIL PRESSURE	
OIL VISCOSITY	
OIL FILTERS	
CLUTCH INTERNAL	
SHIFTING TYPE	
ACTUATOR	
SHIFTING	
HEAT EXCHANGER	



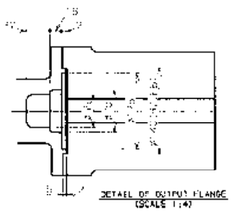


NOTE
MARK ALL BOLTS STAINLESS STEEL BOLTS



OIL DRAIN FLANGE

COOLING WATER INLET AND OUTLET FLANGE



DETAIL OF OUTPUT FLANGE
(SCALE 1:4)

METRIC
THIRD ANGLE PROJECTION

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL
HEAT TREAT
SURFACE TREATMENT
FIRST USE
ASSY.
MODEL MG-6557-00-A
NAME
GENERAL VIEW

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE for MACHINED DIMENSIONS
X ±0.5
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
SCOPE OF TOLERANCING PER ANSI Y14.5M 1982

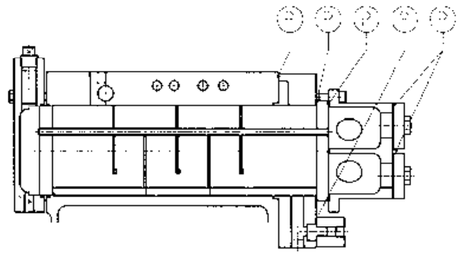
DATE 12-5-03
SCALE 1:5
DRN. KAZ-RTA
CHK.
APPD.

TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

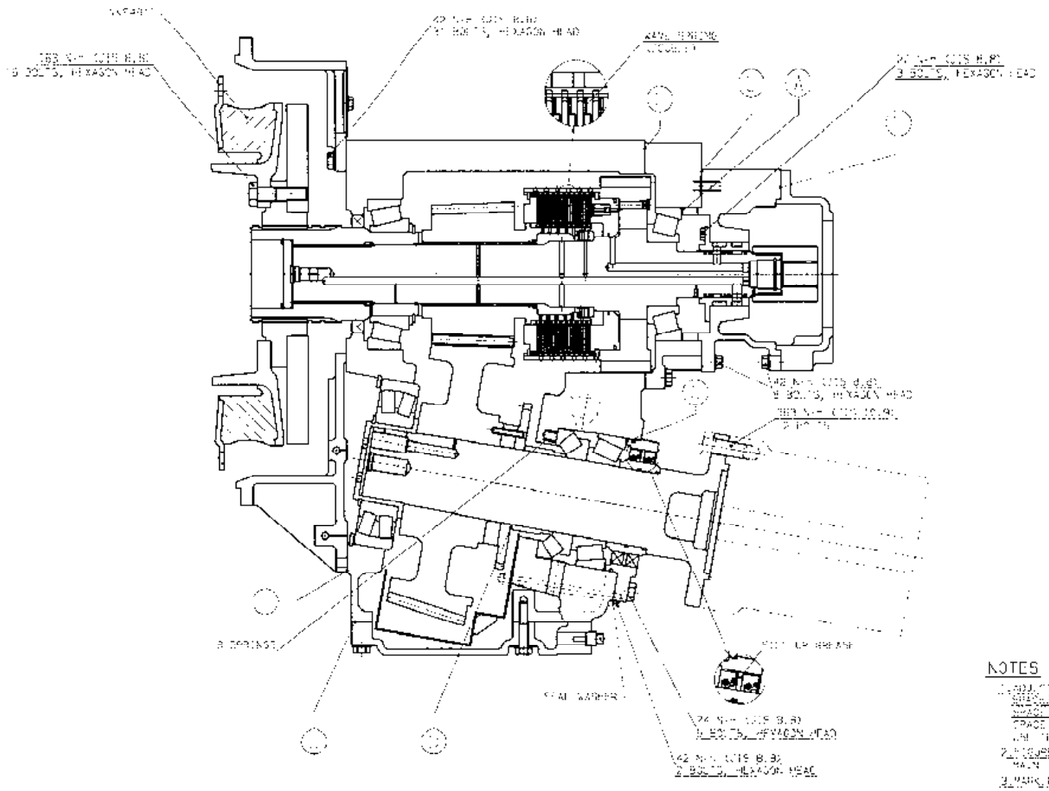
7-37893
SHEET 01 OF 1
REV -9

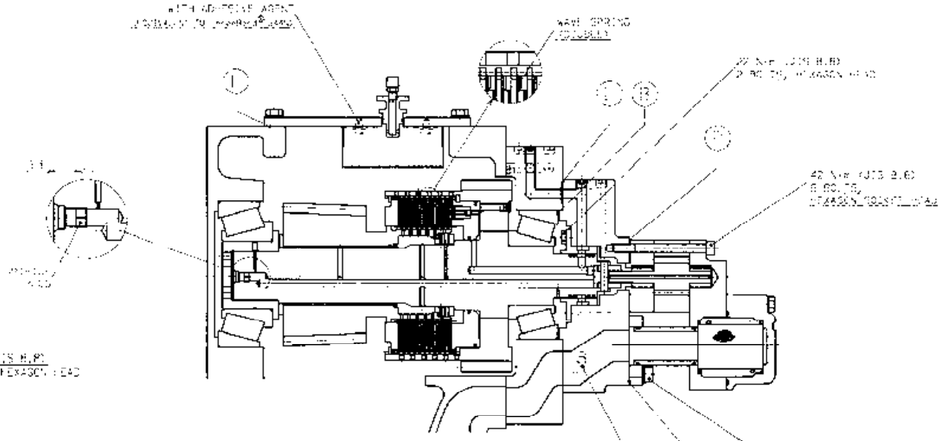
REV	BY	APPD.	DATE
-9	KAZ		12-5-03

A1T

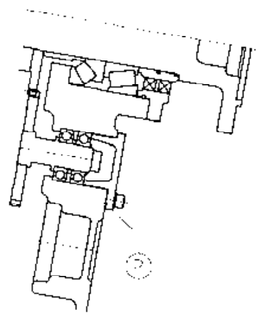


SECTION FOR HEAT EXCHANGER

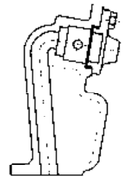




SECTION FOR REVERSE SHAFT & MAIN PUMP



BLIND COVER FOR WITHOUT
TRAILING PUMP



BLIND COVER FOR WITHOUT
OIL STRAINER

NOTES

1. [illegible] SPACE ⑥, ⑦, ⑧ AND ⑨ ARE EACH ONE [illegible]
2. [illegible]
3. SPACE ⑥ REFERS TO OTHER DRAWING 9 13485
   [illegible]
4. [illegible]
   MAIN PUMP AND [illegible]
5. MARK ⑩ [illegible]
   [illegible]

METRIC		
THIRD ANGLE PROJECTION		
DIMENSIONS		

MATERIAL	WEIGHT: XXXXLb	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MACHINED DIMENSIONS: .X ±0.25, .XX ±0.13, .XXX ±0.13, ALL ANGULAR TOLERANCES ± 1° GEOMETRIC TOLERANCING PER ASME Y14.5M-1982
HEAT TREAT	FIRST USE: ASSY. MODEL MC-6557-00-A	DATE: 2-17-94
SURFACE TREATMENT	NAME: SECTIONAL VIEW	SCALE: 1:3
		DRN: YAMAMURA
		CHK: [illegible]
		APPD: [illegible]

TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

7-37894

SHEET 1 OF 1 REV ---

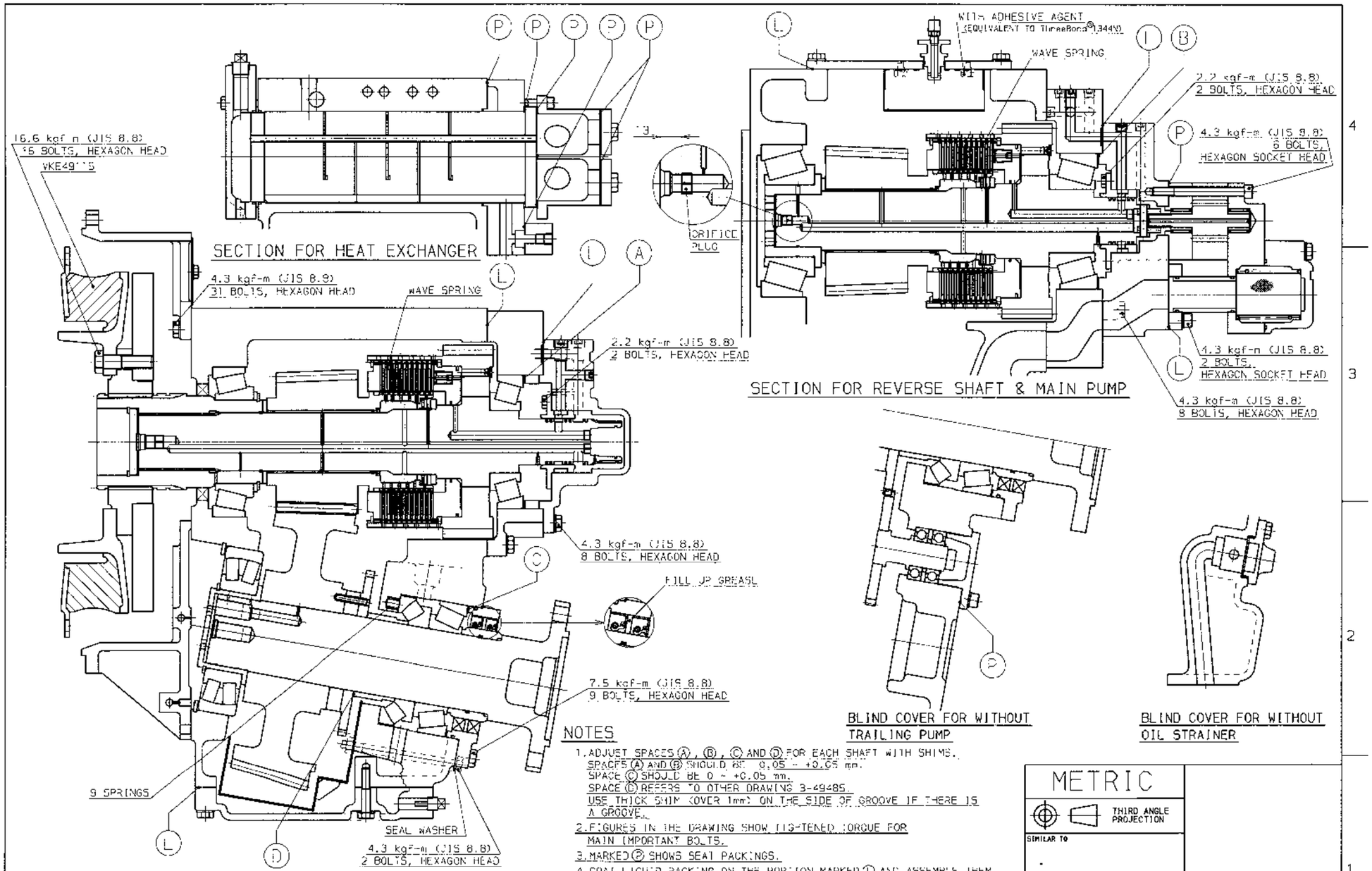
REV	BY	APPD.	DATE

REV	ZONE	CH. NO.	DATE

REV	ZONE	CH. NO.	DATE

NOTICE: THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA. THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

A1T



NOTES

1. ADJUST SPACES (A), (B), (C) AND (D) FOR EACH SHAFT WITH SHIMS.
   SPACES (A) AND (B) SHOULD BE 0.05 ~ +0.05 mm.
   SPACE (C) SHOULD BE 0 ~ +0.05 mm.
   SPACE (D) REFERS TO OTHER DRAWING 3-49485.
   USE THICK SHIM (OVER 1mm) ON THE SIDE OF GROOVE IF THERE IS A GROOVE.
2. FIGURES IN THE DRAWING SHOW TIGHTENED TORQUE FOR MAIN IMPORTANT BOLTS.
3. MARKED (P) SHOWS SEAL PACKINGS.
4. COAT LIQUID PACKING ON THE PORTION MARKED (L) AND ASSEMBLE THEM.

REV	BY	APPD.	REV	ZONE	CH. NO.	DATE	REV	ZONE	CH. NO.	DATE
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	
					*******				*******	

NOTICE: THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL: -
HEAT TREAT: -
SURFACE TREATMENT: -
WEIGHT: - kg
MR²: - kg·m²
FIRST USE
ASSY.
MODEL MG-6557-00-A
NAME: SECTIONAL VIEW

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE mm
MACHINED DIMENSIONS
X. ±0.75
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

DATE: 8-18-98
SCALE: 1:3
DRN. T.WATANABE
CHK. K.Shigeru
APPD. Y.Takeuchi

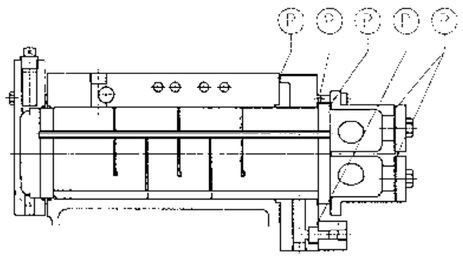
METRIC
THIRD ANGLE PROJECTION
SIMILAR TO: -

TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

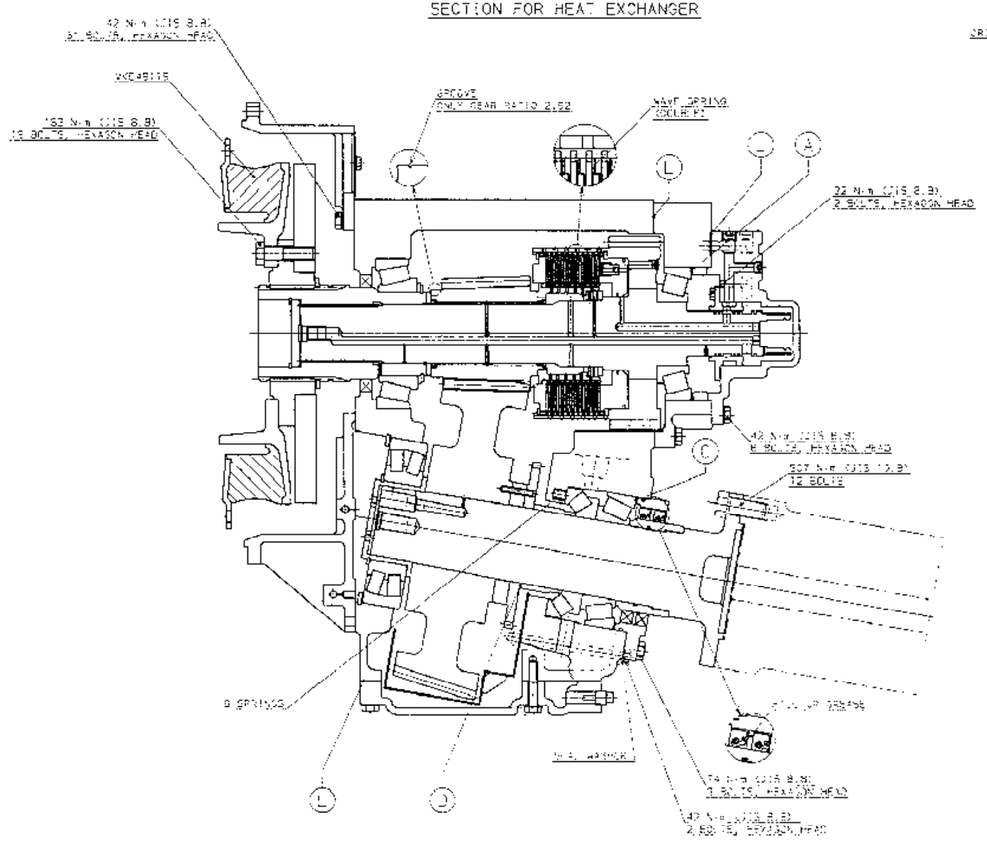
5-49341
SHEET 1 OF 1 REV ---

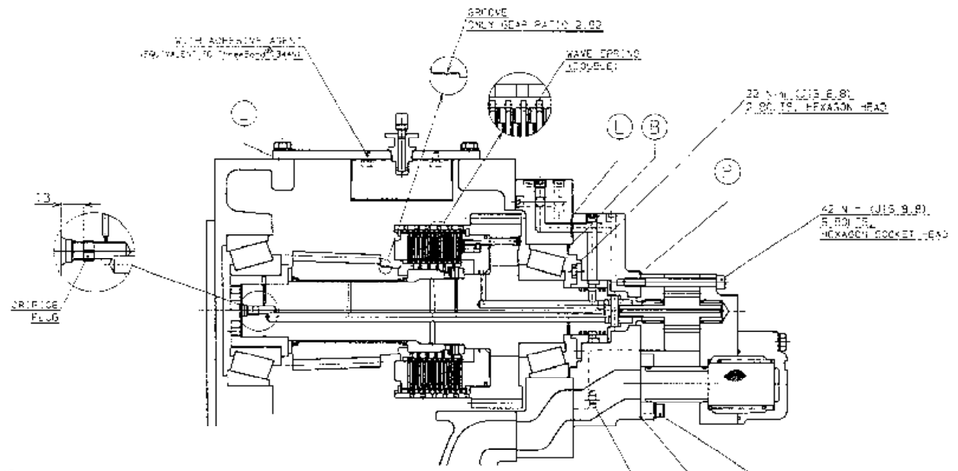
A2T

D C B A

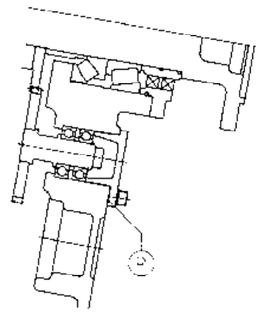


SECTION FOR HEAT EXCHANGER

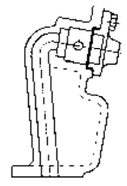




SECTION FOR REVERSE SHAFT & MAIN PUMP



BLIND COVER FOR WITHOUT
TRAILING PUMP



BLIND COVER FOR WITHOUT
OIL STRAINER

NOTES

1. [illegible]
2. [illegible]
3. MARKED @ FROM REAR PACKING.
4. FLOAT LIQUID PACKING ON THE PORTION MARKED ⓐ AND ASSEMBLE THEM.
5. WITH GRADUALLY WHEEL.

METRIC

THIRD ANGLE PROJECTION

STANDARD TO

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

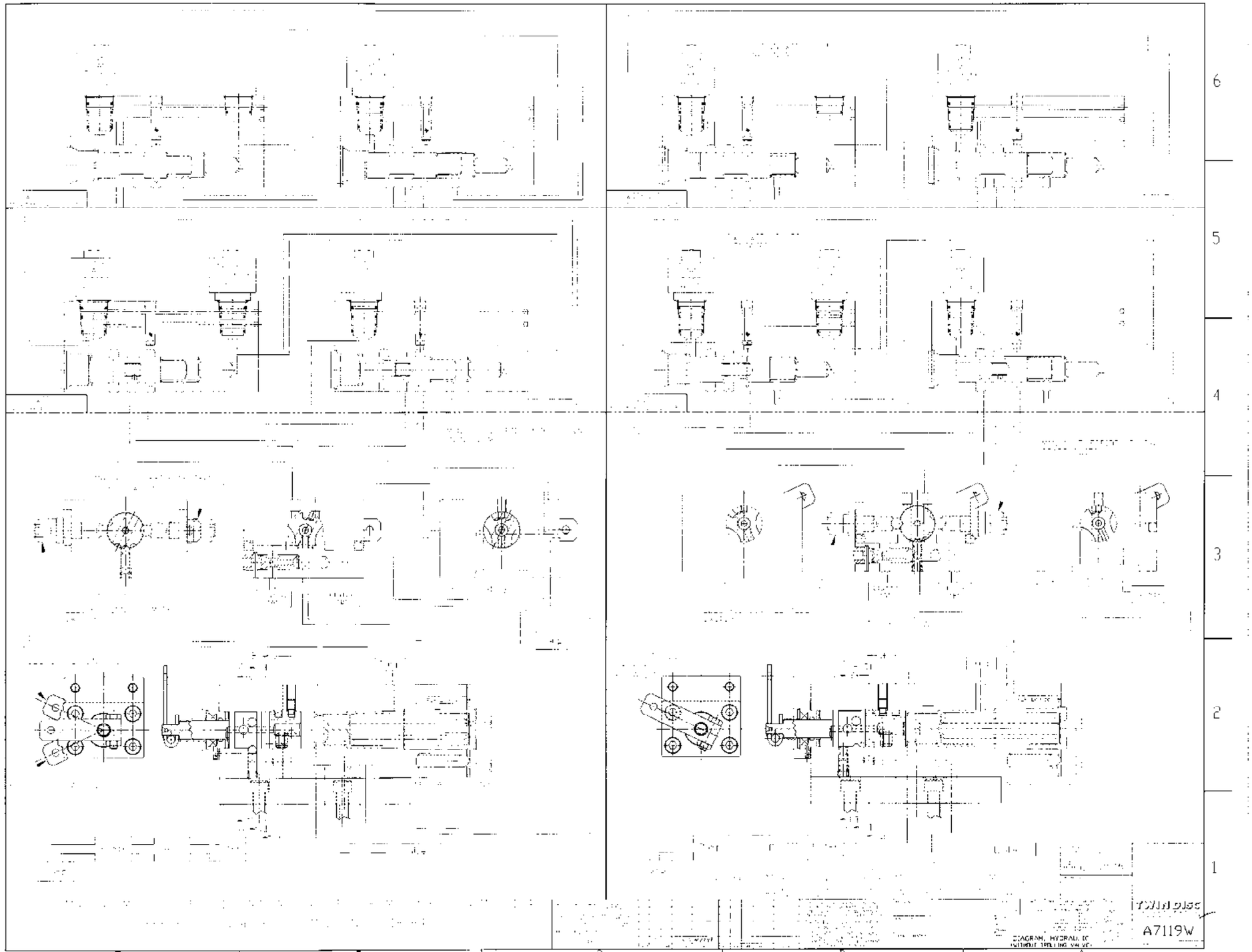
MATERIAL	-
HEAT TREAT	-
SURFACE TREATMENT	-
FINISH	---
FIRST USE	ASSY.
MODEL MG-6557-03-A	
NAME	SECTIONAL VIEW

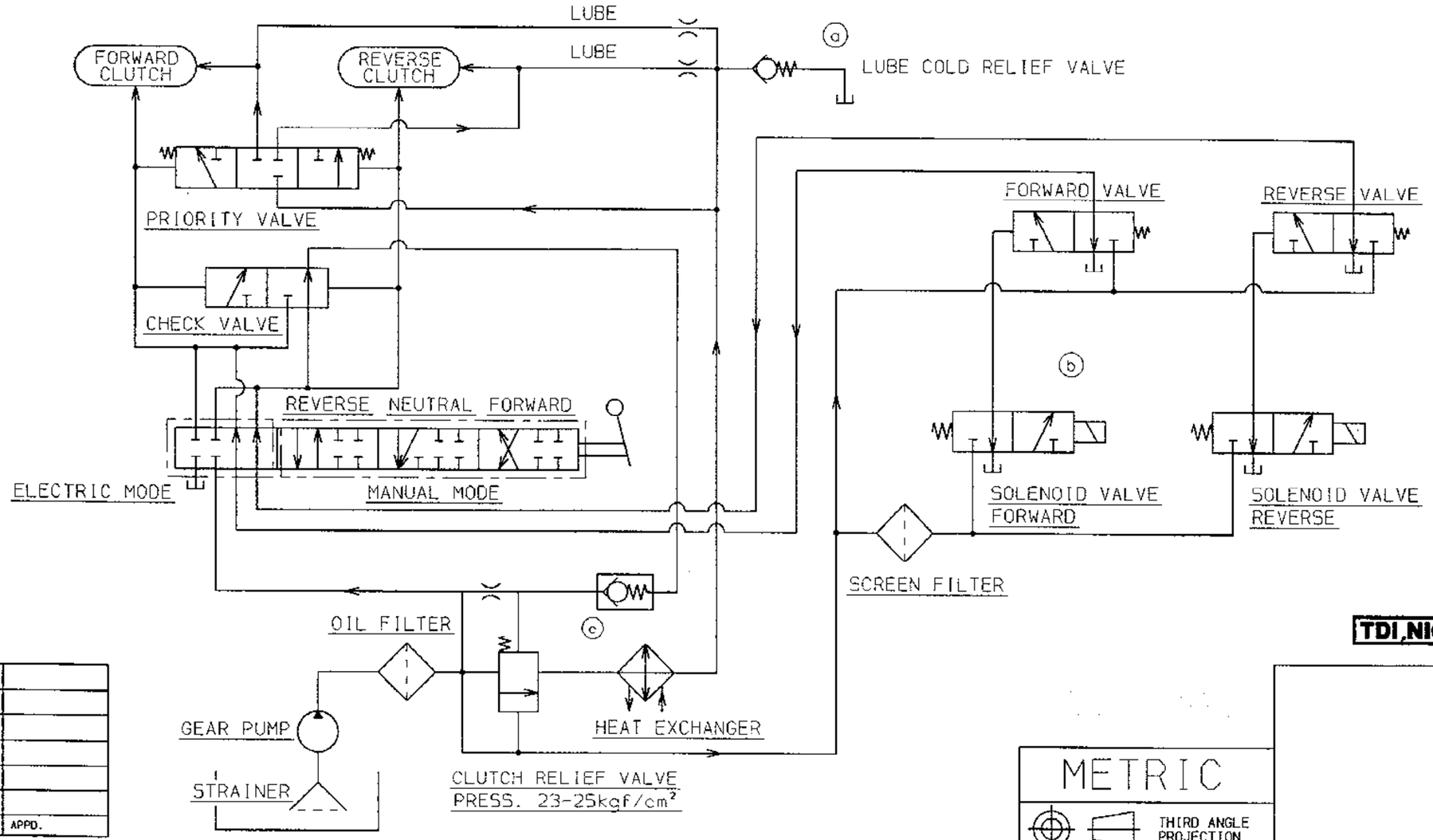
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MACHINED DIMENSIONS
X ±0.5
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1° GENERAL TOLERANCING PER ANSI B14.5M 1982

DATE 03-21-2011
SCALE 1:3
DRN. : WATANABE
CHK. :
APPD. :
DWG. NO. 7-37966
SHEET 1 OF 1 REV ---

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

AIT


6
5
4
3
2
1
E
D
C
B
A
TWIN DISC
A7119W
DIAGRAM, HYDRAULIC
WITHOUT RELIEF VALVES



REV	BY	APPD.
c	Y.K.	
b	Y.K.	
a	K.I.	

REV	CH. NO.	DATE	REV	CH. NO.	DATE
	*******			*******	
	*******			*******	
	*******			*******	
c	--	2-10-98		*******	
b	--	12-16-97		*******	
a	---	5-26-97		*******	

SIMILAR TO

-

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL: -

HEAT TREAT: - -

SURFACE TREATMENT:

WEIGHT: XXXX kg | WR²: N-m²

FIRST USE
ASSY.
MODEL MG-6600-00-DC

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE mm
MACHINED DIMENSIONS
X. ±0.75
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

NAME: HYDRAULIC DIAGRAM

DATE: 970318
SCALE: 1 : 1
DRN. S.NAKAMURA
CHK.
APPD.

METRIC
THIRD ANGLE PROJECTION

TDI,NICO

TWIN DISC INCORPORATED
RACINE, WI 53403 - USA

3-49460

SHEET 1 OF 1 | REV ---

A3T

	VALVE ASS'Y No.	BOM No.	DITCH PLATE No.	DITCH PLATE GASKET	TRANSMISSION GASKET	PISTON	HYD-RAULIC LOCK?	SOLENOID QTY.	SOLENOID No.	VOLTAGE	VALVE SPRINGS SPRING ASS'Y	VALVE SPRINGS CONSISTS OF : OUTER	VALVE SPRINGS CONSISTS OF : INNER	CLUTCH kPa (PSI) NOM.	ORIFICE PLATE No.	X	SHIMS PART NO.	SHIMS APPX. QTY.	MOUNTING SCREWS "R" ✱	MOUNTING SCREWS QTY.	MOUNTING SCREWS "S" ✱	MOUNTING SCREWS QTY.	FIRST USE	DATE AND APPR.
(AC)(AA)	1018084	40750	1017133	1017134	B1337F	1018688	YES	3	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	MA1052A	2	MA1052A	2	MG-5202DC	3-17-98 BAS/BJE
	1018084A	40751	-------	1017383	-------	1017179	NO	2	XM2759FM	24 VDC	-------	A2707BD	A2704BU	2415 (350)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		------		------		MG-6619RV	3-17-98 BAS/BJE
(AA)	1018084B	40752	1017133	1017134	B1337F	1017179	NO	2	XM2759FM	24 VDC	-------	A2707AD		1585 (230)	1017129A	M2051L M2052AA MA1053G	B2451B	USE AS REQUIRED	M2089F	2	M2089AG	2	DD-514V	3-17-98 BAS/BJE
□	1018084C	40753	1017133	1017134	B1337F	1017179	NO	2	XM2759FM	24 VDC	XA2707BZ	A2707BW	A2703BA	1380 (200)	1017129	M2051L M2052AA MA1053G	B2451B		M2089Y	1	M2089F	3	DD-516V	3-17-98 BAS/BJE
(AA)	1018084D	40754	1017133	1017134	B1337F	1017179	NO	2	XM2759FL	12 VDC	-------	A2707AD		1585 (230)	1017129A	M2051L M2052AA MA1053G	B2451B		M2089F	2	M2089AG	2	DD-514V	3-17-98 BAS/BJE
□	1018084E	40755	1017133	1017134	B1337F	1017179	NO	2	XM2759FL	12 VDC	XA2707BZ	A2707BW	A2703BA	1380 (200)	1017129	M2051L M2052AA MA1053G	B2451B		M2089Y	1	M2089F	3	DD-516V	3-17-98 BAS/BJE
(AA)	1018084F	40756	1017133A	1017134	B1337F	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		M2089F	2	M2089F	2	MG-5111	3-17-98 BAS/BJE
(AA)	1018084G	40757	1017133A	1017134	B1337F	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		M2089F	2	M2089F	2	MG-5111	3-17-98 BAS/BJE
(Z)(P)(F)	1018084H	40758	1017583	1017569	1017613	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	0	MA1062B	2	MA1062G	2	MG-5600	3-17-98 BAS/BJE
(Z)(P)(F)	1018084J	40761	1017583	1017569	1017613	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	0	MA1062B	2	MA1062G	2	MG-5600	3-17-98 BAS/BJE
(AA)	1018084K	40762	1017133A	1017134	B1337F	1017179	NO	2	XM2759FM	24 VDC	--------	A2707AD		1585 (230)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	USE AS REQUIRED	MA1052B	2	MA1052B	2	MG-5114	3-17-98 BAS/BJE
(AA)	1018084L	40763	1017133A	1017134	B1337F	1017179	NO	2	XM2759FL	12 VDC	--------	A2707AD		1585 (230)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		MA1052B	2	MA1052B	2	MG-5114	3-17-98 BAS/BJE
(F)	1018084M	40764	-------	1017383	-------	1018688	NO	2	XM2759FM	24 VDC	--------	A2707BC A2707AX	A2704BU	2415 (350)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		------		------		MG-6984 61E4E	3-17-98 BAS/BJE
(Z)(P)(F)	1018084N	40775	1017583	1017569	1017613	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	0	MA1062B	2	MA1062J	2	MG-5600DR	4-8-98 BAS
(AA)(T)(R)(F)	1018084P	40817	-------	-------	-------	1018688	NO	2	XM2759FM	24 VDC	XA2707AD	A2707AD	A2703AB	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B		------		------		MG-6650SC	7-23-98 BAS/AZ
(AD)(AA)(K)	1018084Q	40842	1017133	1017134	B1337F	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	USE AS REQUIRED	MA1052K	2	MA1052K	2	MG-5202SC	8-5-98 BAS/RM
(W)	1018084R	40935	-------	1017383	-------	1017179	YES	3	XM2759FM	24 VDC	-------	A2707BD	A2704BU	2415 (350)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		------		------		MG-6557	10-5-98 JRB/DAS
(AD)(AA) □	1018084S	40954	1018584	1018594	B3117A	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B		M1732AH	2	M1732AH	2	MG-540	11-5-98 BAS/BJE
	1018084T	40955	-------	1017383	-------	1017179	NO	2	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2655 (385)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	5	------		------		MG-6449	11-4-98 BAS/BJE
(AH)(AF)(W)	1018084U	40956	-------	1017383	-------	1017179	NO	2	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2550 (370)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	4	------		------		MG-6557	11-6-98 BAS/BJE
(AF)	1018084V	40957	-------	1017383	-------	1017179	NO	2	XM2759FM	24 VDC	-------	A2707AX A2707BC	A2704BU	2450 (355)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	5	------		------		MG-6600 MG-6619	11-6-98 BAS/BJE
(AD)(AA)(J)	1018084W	40958	1017133	1017134	B1337F	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	MA1052A	2	MA1052A	2	MG-5202DC	11-18-98 VR/VTV
(AA)	1018084X	40964	1017133A	1017134	B1337F	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	M2089AR	2	M2089AR	2	MG-5141	11-24-98 RM/VTV
(T)(R)(G)	1018084Y	41028	-------	-------	-------	1018688	NO	2	XM2759FL	12 VDC	XA2707AD	A2707AD	A2703AB	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-6650SC	12-22-98 BJW/BAS
(AA)(R)	1018084Z	41045	-------	1017134	-------	1018688	NO	2	XM2759FM	24 VDC	XA2707AD	A2707AD	A2703AB	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5205DC	2-18-99 JS/BJE
(Z)	1018084AA		1017583	1017569	1017613	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	0	MA1062B	2	MA1062J	2	MG-5600DR	
(AD)(AA)	1018084AB	41093	1017133	1017134	B1337F	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	MA1052A	2	MA1052A	2	MG-5202DC	5-24-99 JS/VTV
(AH)	1018084AC	40967	-------	1017383	-------	1017179	YES	3	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2655 (385)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	5	------		------		MG-6449-RV	7-9-99 JS/DAS
(S)(Q)	1018084AD	41114	-------	-------	-------	1018688	NO	2	XM2759FL	12 VDC	-------	A2707BD A2707BC	A2704BU	2415 (350)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-6848SC	8-2-99 ALC/DAS
(S)(Q)	1018084AE	41115	-------	-------	-------	1018688	NO	2	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2415 (350)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-6848SC	8-2-99 ALC/DAS
(AE)(AA)	1018084AF	41118	1017133	1017134	B1337F	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	MA1052K	2	MA1052K	2	MG-5202SC	8-11-99 JS/DAS
(AF)(AA)	1018084AG	41163	-------	1017134	-------	1018688	NO	2	XM2759FL	12 VDC	XA2707AD	A2707AD	A2703AB	2000 (290)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5205DC	11/19/99 ALC/DAS
(AG)(V)	1018084AH	41171	-------	-------	-------	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5170DC	11/19/99 ALC/DAS
(AA)(V)	1018084AJ	41172	-------	-------	-------	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5170DC	11/19/99 ALC/DAS
(AC)(AA)(V) □	1018084AK	41244	1018584	1018594	B3117A	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	M1732AH	2	M1732AH	2	MG-540	2/11/00 ALC/DAS
(AA)	1018084AL	41250	-------	-------	-------	1018688	NO	2	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-520-1HP	2/11/00 ALC/DAS
(AA)	1018084AM	41251	-------	-------	-------	1018688	NO	2	XM2759FL	12 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-520-1HP	2/11/00 ALC/DAS
(AA)	1018084AN	41196	-------	-------	-------	1017179	NO	2	XM2759FM	24 VDC	-------	A2707AD	A2703BA	1860 (270)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5141SC	3/23/00 ALC/DAS
(AA)	1018084AP	41195	-------	-------	-------	1017179	NO	2	XM2759FL	12 VDC	-------	A2707AD	A2703BA	1860 (270)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5141SC	3/23/00 ALC/DAS
(AF)(W)	1018084AQ	41337	-------	1017383	-------	1017179	YES	3	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2550 (370)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	4	------		------		MG-6557	4/28/00 ALC/DAS
(AF)	1018084AR	41446	-------	1017383	-------	1017179	YES	3	XM2759FM	24 VDC	-------	A2707AX A2707BC	A2704BU	2450 (355)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	5	------		------		MG-6600 MG-6619	6/21/00 BJW/ALC
	1018084AS	41718	-------	-------	-------	1018688	YES	3	XM2759FM	24 VDC	XA2707Z	A2707Z	A2703T	1725 (250)	1017129A	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-5170DC	4/26/01 JR/ALC
	1018084AT	42206	-------	-------	-------	1018688	YES	3	XM2759FM	24 VDC	-------	A2707BD A2707BC	A2704BU	2415 (350)	1017129B	MA1038EOM27 X 2.0-6H	B2451B	AS REQ.	------		------		MG-6848SC	10-17-02 BJW/ALC

WIRING DIAGRAM:

CONNECTOR

PORT 'A' SOLENOID — A

PORT 'B' SOLENOID — B

NEUTRAL SOLENOID — C, D, E, F

OPTIONAL:
MATING WIRING HARNESS 1017403 SERIES (SPECIFY LENGTH).

MANUAL OVERRIDE NEUTRAL START SWITCH (CLOSED ONLY WHEN MANUAL OVERRIDE IS IN USE & TRANSMISSION IS IN NEUTRAL) MAX. I = 20 A.

ELECTRIC CONTROL MODE SWITCH (CLOSED WHEN MANUAL VALVE STEM IS LOCKED IN ELECTRIC MODE.) MAX. I = 20 A.

TOP VIEW

NOTE:
SECURE LEVER IN THE DEPRESSED "ELECTRIC CONTROL MODE" POSITION BY LOOPING PLASTIC STRAP THRU 1/4" HOLE IN LEVER & M8 THREADED HOLE BEHIND - PULL TIGHT, TRIM END SHORT.

NOTE:
LEVER MAY BE LOCATED ANYWHERE ON ITS SHAFT THAT PERMITS FREE MOVEMENT WITHIN THE 50° (TOTAL) ROTATION & 11.4mm AXIAL MOTION REQUIRED FOR CONTROL.

NOTE:
INSTALL USING MA908 (LOCTITE #242). THREAD DOG POINT INTO DETENT GROOVE UNTIL SNUG. BACK-OFF 1/2 TURN.

THESE SOLENOID CONNECTIONS ARE NOT POLARITY SENSITIVE.

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

NOTE:
INSTALL USING MA908 (LOCTITE #242) TOP OF SCREW MUST BE FLUSH WITH SURFACE.

BOTTOM VIEW

X - STR. TH'D. "O" RING (ISO6149) MAIN PRESSURE OIL INLET (WHEN © NOT INTERNALLY SUPPLIED). THREAD SIZE AT PORT "a": 1/4-18 N.P.T.F. WHEN M22SAA REDUCER BUSHING IS SPECIFIED.

SWITCH - MA866A (2) APPLY MA895 (THREAD SEALANT WITH TEFLON®) TO THREADS. TORQUE TO 30.0 lbf.-ft. (40.7 N-m)

A_1 = ATMOSPHERIC PRESSURE
A_2 = ATMOSPHERIC PRESSURE
I.P. = INTERMEDIATE PRESSURE
C.P. = CLUTCH PRESSURE

(AB) □ OBSOLETE FOR PRODUCTION AND SERVICE

△ NOT SERVICEABLE SEPARATELY

✱ THESE PARTS ARE TO BE PACKAGED SEPARATELY AND SHIPPED WITH UNIT.

PARTS FOR UNITS WITHOUT NEUTRAL SOLENOID AND HYDRAULIC LOCK (OPTIONAL CONDITION)

WIRING DIAGRAM: OPTIONAL:
MATING WIRING HARNESS 1017404 SERIES (SPECIFY LENGTH).

CONNECTOR
PORT 'A' SOLENOID — A
PORT 'B' SOLENOID — B
C, D

REV	ZONE	CH. NO.	DATE
AH		ECN10970	8-9-02
AG		ECN10415	1-11-02
AF	A-4,-5	ECN10553	12-3-01

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL: ---------- | HEAT TREAT: ---------- | SURFACE TREATMENT:

WEIGHT kg | WEIGHT lb

FIRST USE: ASSY. 1015207 MODEL MG-5202DC

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE mm
MACHINED DIMENSIONS
X ±0.75
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

NAME: VALVE ASS'Y. - CONTROL (WITHOUT TROLLING VALVE)

DATE 3-23-98 | SCALE .50 = 1.00 | DRN. RM | CHK. RM/BJE | APPD. DAS

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

1018084 SERIES

SHEET 1 OF 1 | REV AH

HYDRAULIC DIAGRAM A7119W, SHEET 1 OF 2

METRIC — THIRD ANGLE PROJECTION

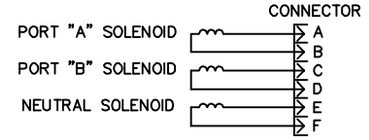
SIMILAR TO

F E D C B A

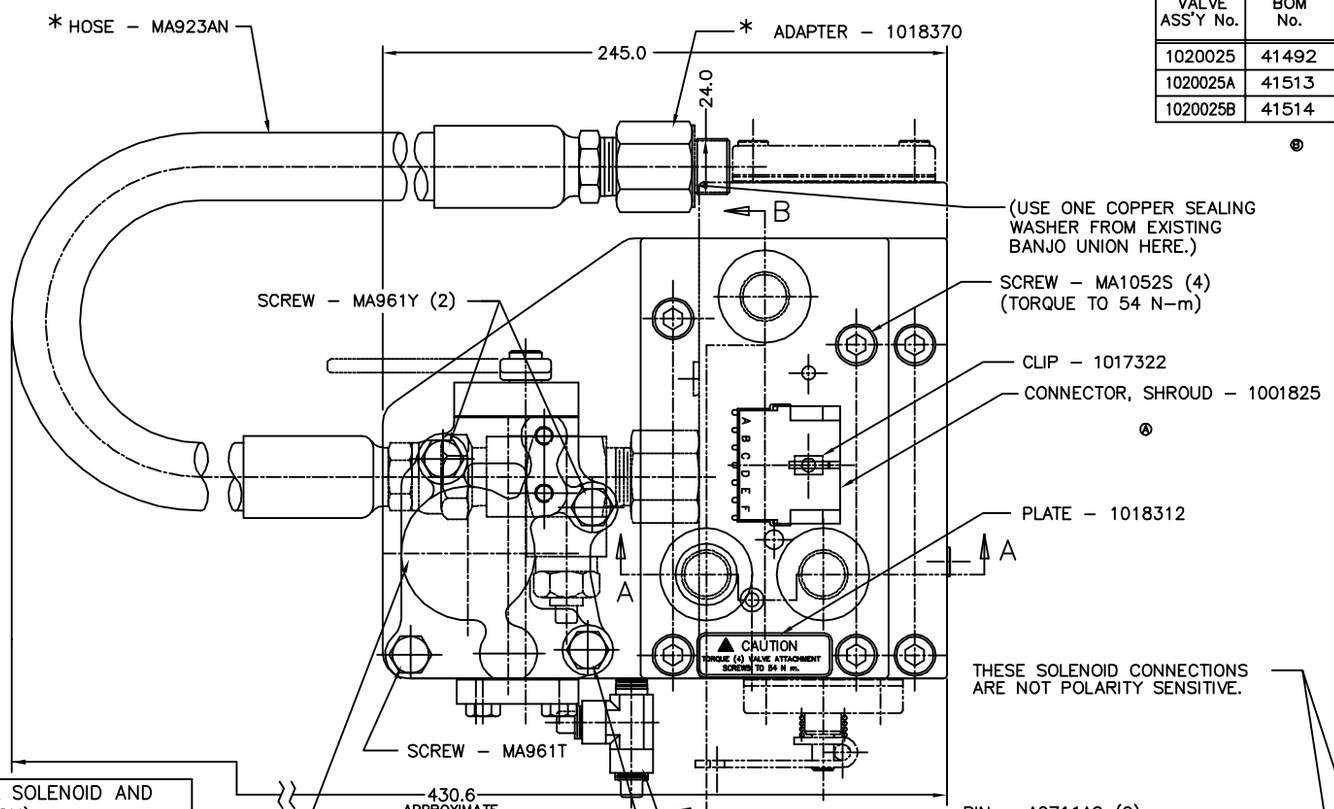
VALVE ASS'Y No.	BOM No.	TROLLING VALVE ASS'Y	HYD-RAULIC LOCK?	SOLENOID QTY.	SOLENOID No.	VOLTAGE	COMMENT	FIRST USE	DATE AND APPR.
1020025	41492	1-68753-G	NO	2	XM2759FM	24 VDC	--------	MG-6557SC	9-21-00 ALC/BJE
1020025A	41513	1-68753-G	YES	3	XM2759FM	24 VDC	--------	MG-6557SC	9-29-00 ALC/BJE
1020025B	41514	1-68753-G	YES	3	XM2759FM	24 VDC	SEE SEPARATE DWG	MG-6557/6619 W/HYD. PTO	10-3-00 AZ/ALC

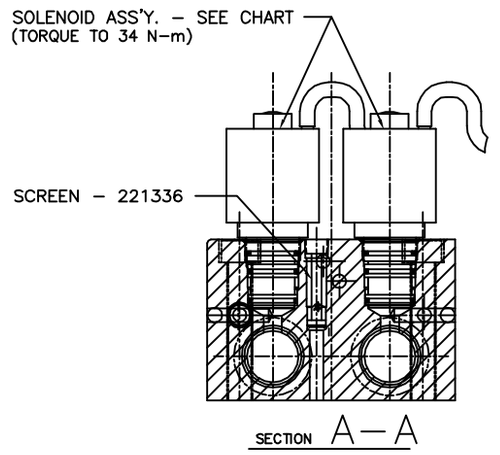
Ⓑ Ⓐ

WIRING DIAGRAM:



OPTIONAL:
MATING WIRING HARNESS 1017403 SERIES (SPECIFY LENGTH).

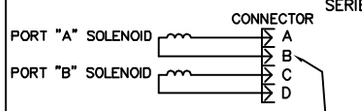




THESE SOLENOID CONNECTIONS ARE NOT POLARITY SENSITIVE.

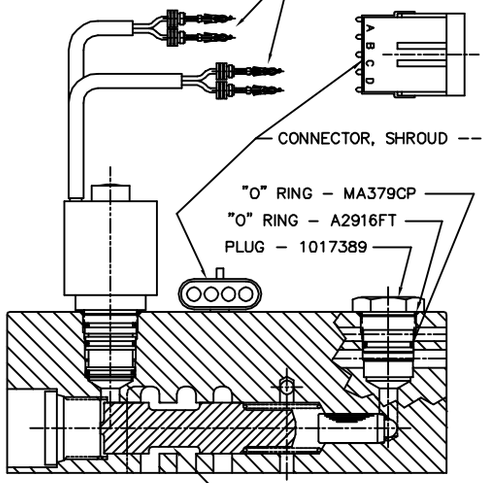
PARTS FOR UNITS WITHOUT NEUTRAL SOLENOID AND HYDRAULIC LOCK (OPTIONAL CONDITION)

WIRING DIAGRAM:

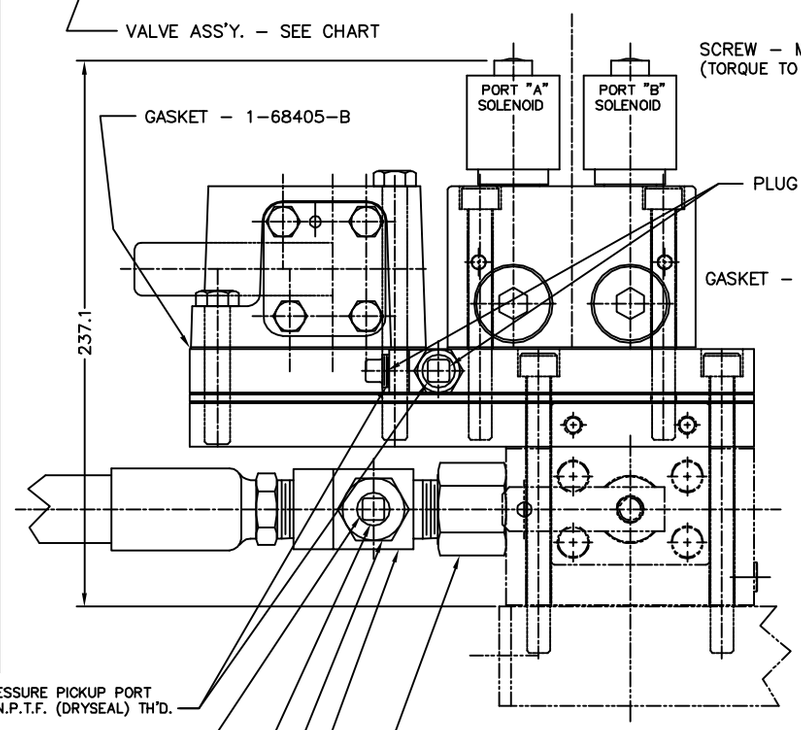


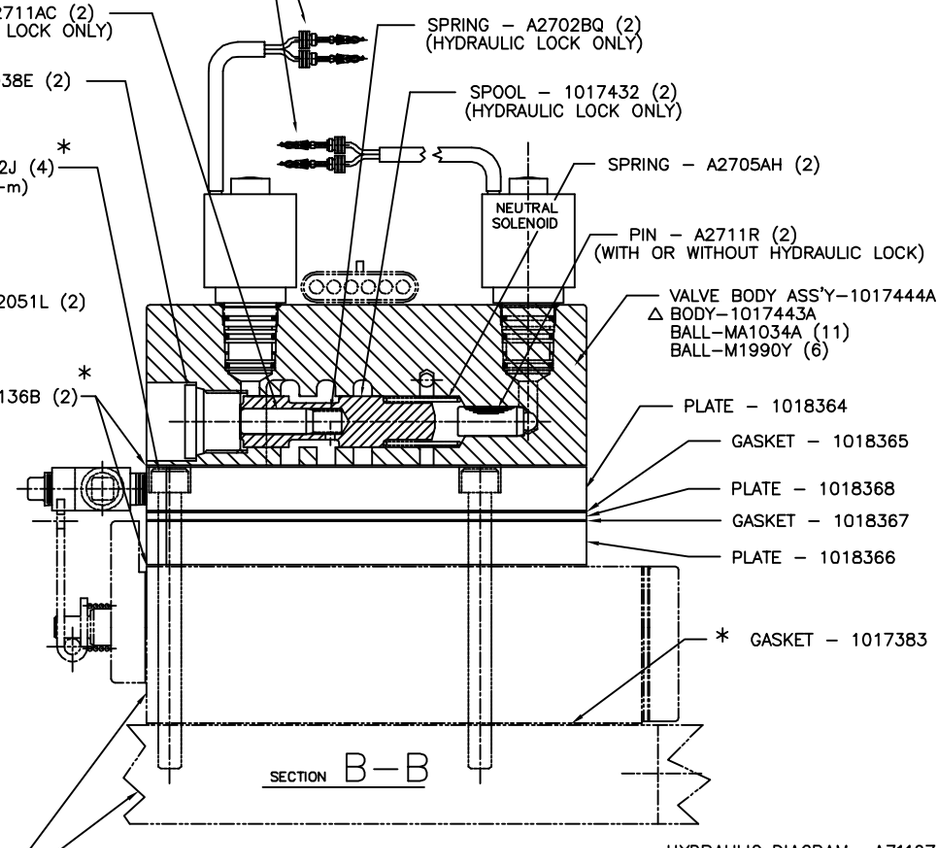
OPTIONAL:
MATING WIRING HARNESS 1017404 SERIES (SPECIFY LENGTH).

THESE SOLENOID CONNECTIONS ARE NOT POLARITY SENSITIVE.



Ⓐ


VALVE ASS'Y. – SEE CHART
PORT "A" SOLENOID
PORT "B" SOLENOID
GASKET – 1–68405–B
PLUG – M2051L (2)
237.1
MAIN PRESSURE PICKUP PORT 1/4–18 N.P.T.F. (DRYSEAL) TH'D.
OIL TEMPERATURE PICKUP PORT 1/4–18 N.P.T.F. (DRYSEAL) TH'D.
* PLUG – M2051L
REDUCER – M2052AA
* TEE – MA711C
* ADAPTER – MA1053G


PIN – A2711AC (2) (HYDRAULIC LOCK ONLY)
PLUG – MA1038E (2)
SPRING – A2702BQ (2) (HYDRAULIC LOCK ONLY)
SPOOL – 1017432 (2) (HYDRAULIC LOCK ONLY)
* SCREW – MA1052J (4) (TORQUE TO 54 N–m)
SPRING – A2705AH (2)
NEUTRAL SOLENOID
PIN – A2711R (2) (WITH OR WITHOUT HYDRAULIC LOCK)
VALVE BODY ASS'Y–1017444A
△ BODY–1017443A
BALL–MA1034A (11)
BALL–M1990Y (6)
* GASKET – 1017136B (2)
PLATE – 1018364
GASKET – 1018365
PLATE – 1018368
GASKET – 1018367
PLATE – 1018366
* GASKET – 1017383
SECTION B–B

THIS KIT FOR USE WITH EXISTING LOWER VALVE AS–INSTALLED ON TRANSMISSION.

△ NOT SERVICEABLE SEPARATELY

* THESE PARTS ARE TO BE PACKAGED SEPARATELY AND SHIPPED WITH UNIT.

HYDRAULIC DIAGRAM– A7119Z

REV	ZONE	CH. NO.	DATE
B	B6	30380	10-12-00
A	--	30332	10-5-00

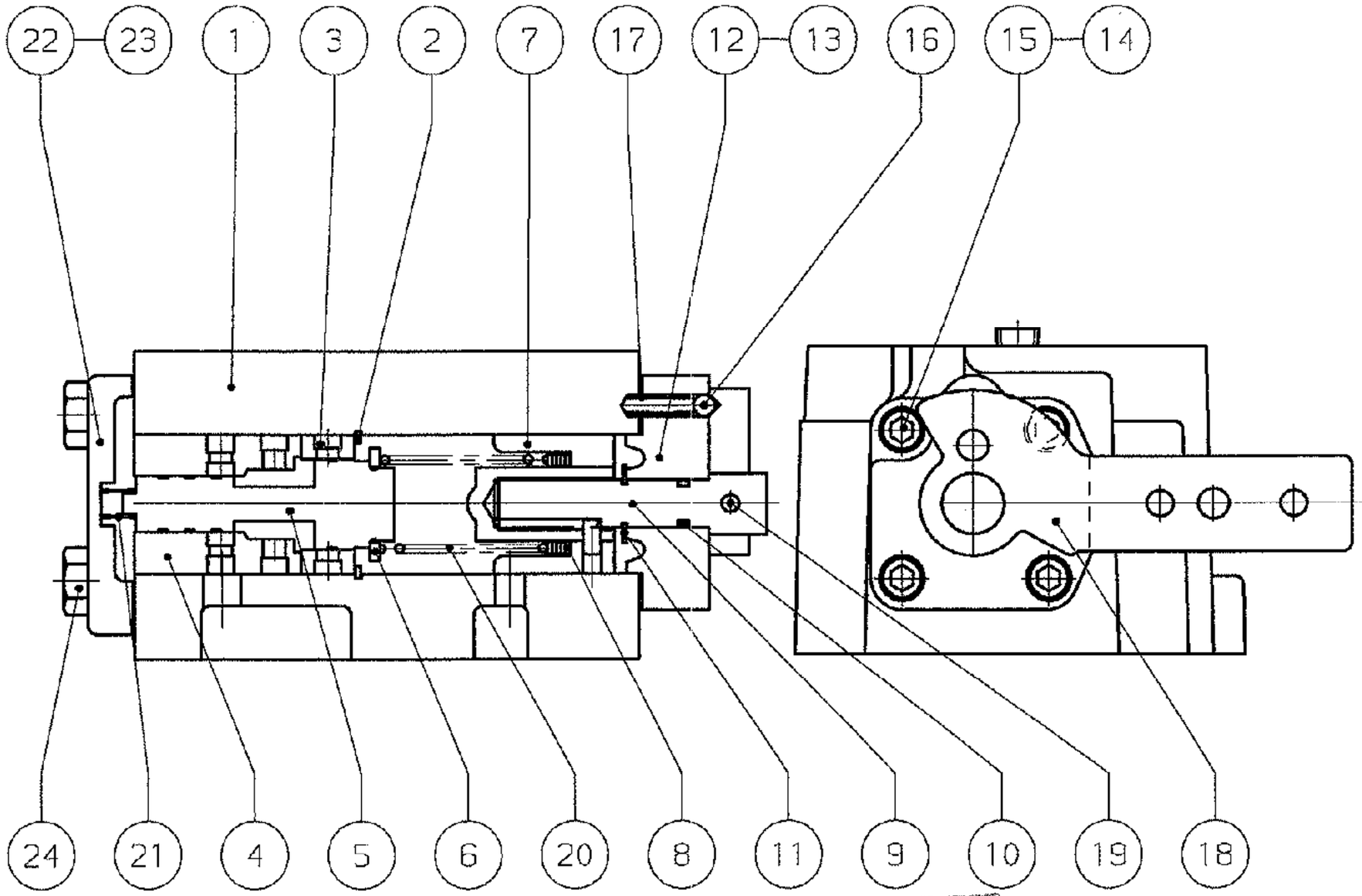
NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 – USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL: ----------
HEAT TREAT: ----------
SURFACE TREATMENT:
WEIGHT: kg / lb
FIRST USE: ASSY. MG–6557SC SERIES
MODEL:
NAME: VALVE ASS'Y. – CONTROL (TROLLING VALVE FIELD INSTALLATION)
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE mm / MACHINED DIMENSIONS X ±0.76, X.X ±0.25, X.XX ±0.13 / ALL ANGULAR TOLERANCES ±1° / GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982
DATE: 09–21–00
SCALE: 1.00=1.00
DRN. AZ
CHK. ALC
APPD. BJE

METRIC
THIRD ANGLE PROJECTION
SIMILAR TO

TWIN DISC INCORPORATED RACINE, WI 53403 – USA
1020025
SHEET 1 OF 1 REV B

E D C B A



ITEM	PARTS NO.	N A M E	Q'TY	REMARKS
1	1-68438-A	VALVE AS	1	
2	N058003200	RING, SNAP	1	
3	1-52546	BUSH	1	
4	1-52545-E	BUSH	1	
5	1-52540-B	PISTON	1	
6	1-9241-KY	WASHER	1	
7	1-53608-E	PISTON AS.	1	
8	1-51080	SHIM	5	
9	1-50864-C	SHAFT, TROLLING VALVE	1	
10	N048002049	RING, "O"	1	
11	N083009000	RING, E TYPE SNAP	1	
12	1-12942	COVER	1	
13	1-12948-C	GASKET	1	
14	N113806030	SCREW, SOCKET HEAD	2	
15	N113806020	SCREW, SOCKET HEAD	2	
16	N131004762	BALL, STEEL	1	
17	N050005023	SPRING	1	
18	1-50863-D	HANDLE	1	
19	N075040020	PIN, ROLL	1	
20	K175022027	SPRING	1	
21	N175009004	SPRING	1	
22	1-54665-C	COVER	1	
23	1-61158-D	GASKET	1	
24	N085708025	SCREW, HEX.HEAD	4	

SYMBOL	DESCRIPTION	CHANGE NO.	DATE	SIGNATURE	APPROVED
		********			
		********			
		********			
		********			

REVISIONS

ISSUED
KAMO PLANT
2000 SEP 20
NIIGATA CONV... CO.,LTD.
KAM...

APPROVED K. Ishizawa	MATERIAL -		MODEL MG6984SC
CHECKED	HEAT TREATMENT - -		NAME VALVE, TROLLING AS.
DESIGNED K. Hayashi			
DRAWN K. HAYASHI	SCALE 1:1.5	3RD ANGLE PROJECTION	DRAWING NO. 1-68753-G
DATE 990906			

NIIGATA CONVERTER CO.,LTD.
TOKYO JAPAN

ITEM	PARTS NO.	N A M E	Q'TY	REMARKS
ⓐ 1	1-53114-J	PUMP, TROCHOID	1	
2	1-52905-B	GASKET	1	
ⓐ 3	N113806060	SCREW, SOCKET HEAD	3	
4	1-11017 C	COUPLING, OLDHAM	1	
5	1-77901	MOUNT, PUMP AS.	1	
6	1-77837	GASKET	1	
7	1-54942	STRAINER	1	
8	N048006043	RING, "O"	1	
9	101012-A	VALVE, NONRETURN	1	
10	1 71198 A	GASKET	*	
11	1-77848	PIPING AS.	*	

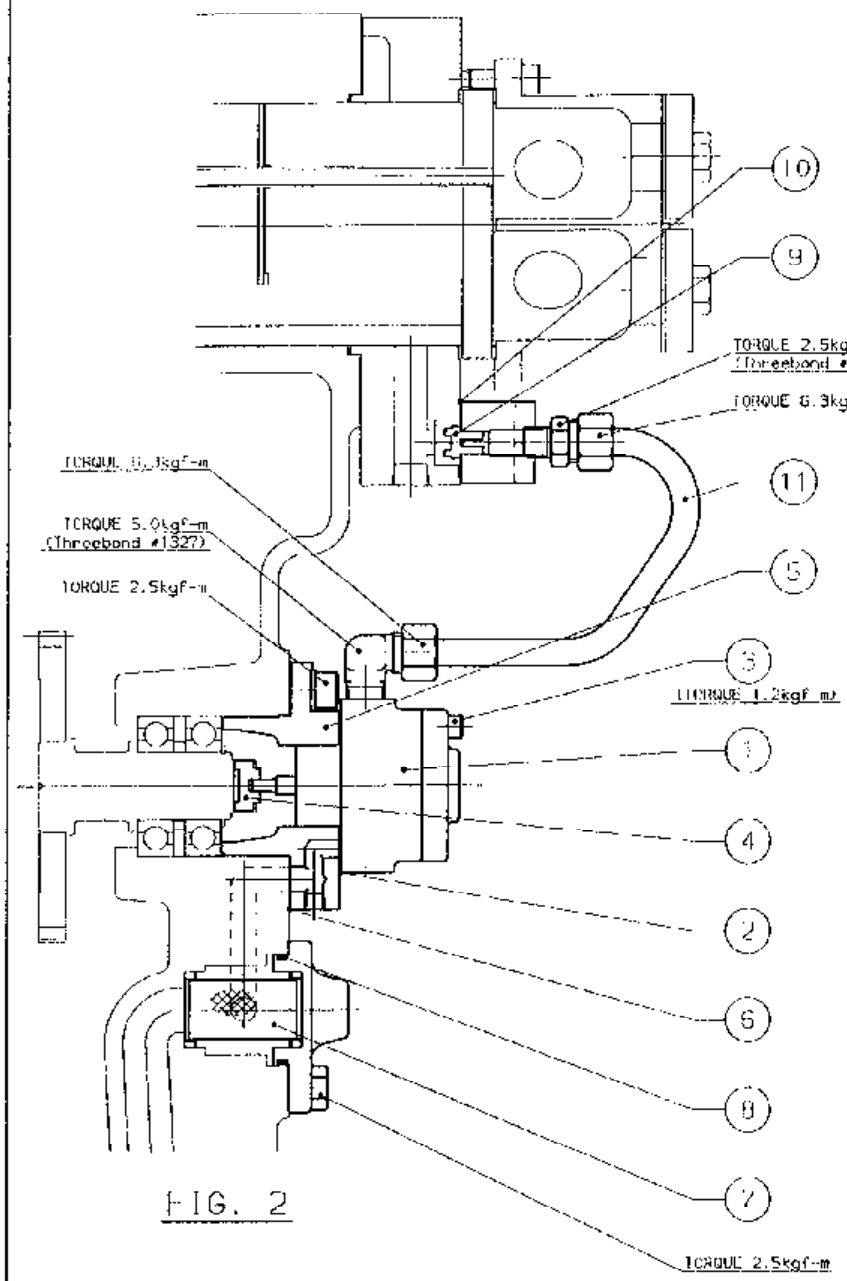
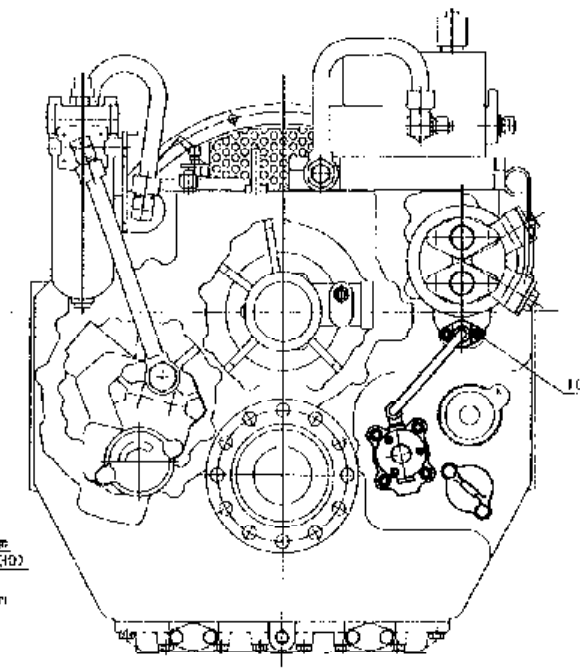


FIG. 2



COMPLETED VIEW

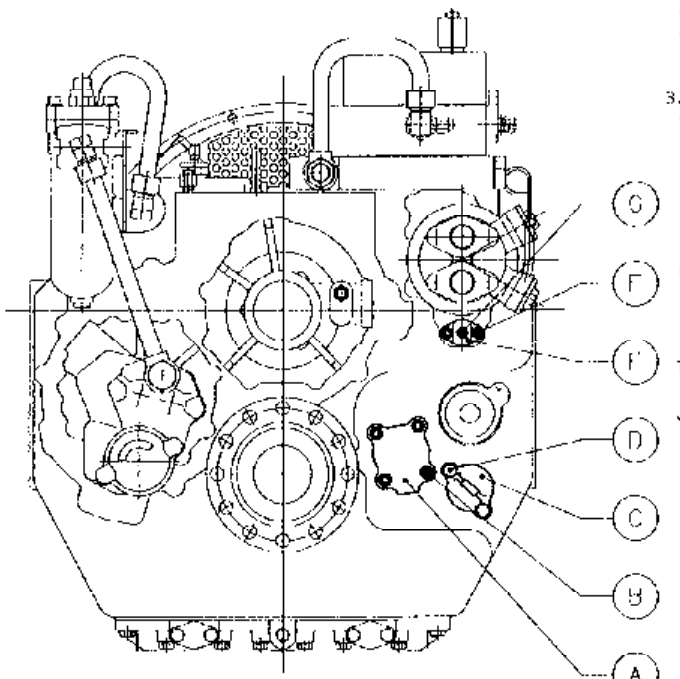


FIG. 1

INSTALLATION WORK SHOULD BE MADE AS PER THE FOLLOWING INSTRUCTIONS.

1. ITEMS TO BE NOTED AT THE INSTALLATION WORK
   (1) CIRCLED FIGURES INDICATE THE ADDITIONAL PARTS FOR THE INSTALLATION WORK. AS MARKED INDICATE PRE-FITTED PARTS ON THE GEARBOX.
   (2) REFER TO THE ATTACHED FIGURES FOR THE EXACT INSTALLATION. TAKE CARE TO MATCH THE PATTERNS OF GASKETS WITH THOSE OF THE PARTS TO BE ATTACHED.
   (3) BEFORE THE INSTALLATION, REMOVE THE DUST FROM THE PARTS BY OIL WASHING AND AIR BLOWING.
   (4) WHEN THE PIPING ARE HARD TO INSTALL, TRY AGAIN AFTER ADJUSTING THE LOCATION OF THE BASE PARTS BY LOOSING THEIR SCREWS.

2. REMOVAL OF THE PRE-FITTED PARTS (REFER TO FIG. 1)
   (1) REMOVE COVER Ⓐ, Ⓒ AND FLANGE Ⓔ.
   (2) REMOVE PLUG Ⓖ FROM FLANGE Ⓔ.
   (3) KEEP SCREW ⒷⒹⒻ, COVER Ⓒ AND FLANGE Ⓔ FOR REUSE AT THE INSTALLATION OF THE TRAILING PUMP KIT.

3. INSTALLATION OF TRAILING PUMP (REFER TO FIG. 2)
   (1) INSTALLATION OF TRAILING PUMP
      A. ATTACH THE PUMP BASE ⑤ WITH GASKET ⑥ BY SCREWS ⑧.
      B. ATTACH THE OLDHAM COUPLING ④ TO THE SHAFT. INSTALL THE GASKET ② AND PUMP ① BY SCREWS ③. IN THIS WORK, MAKE SURE THAT THE HOLE OF THE GASKET MEETS THE HOLE OF THE PUMP BODY.
      NOTE:
      USE GREASE DURING THE OLDHAM COUPLING AND THE SHAFT TO PREVENT THE COUPLING FALL.
   (2) ASSEMBLY OF NONRETURN VALVE
      A. INSERT THE NONRETURN VALVE ⑨ TO FLANGE Ⓔ WITH GASKET ⑩ BY SCREW Ⓕ.
      B. INSTALL THE PIPING ASSEMBLY ⑪ ON THE GEARBOX AS PER FIG. 2.
      C. INSERT THE STRAINER ⑦ TO THE GEARBOX AND INSTALL THE COVER Ⓒ WITH "O"RING ⑧.

THE INSTALLATION WORK IS COMPLETED.

NOTE: THE STRAINER SHALL BE CLEANED EVERY TIME AT CHANGING OIL.

BOM. NO. 5703153

METRIC

THIRD ANGLE PROJECTION

SIMILAR TO

REV	BY	APPD.	REV	ZONE	CH. NO.	DATE	REV	ZONE	CH. NO.	DATE
01	T.WATANABE	K.Shibuya	01	B4	MK12149	03'11'22				

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO NULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

MATERIAL -

HEAT TREAT -

SURFACE TREATMENT

WEIGHT kg | Nm

FIRST USE
ASSY.
MODEL MG-6557-00-SC

NAME OPTION KIT (TRAILING PUMP KIT)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE mm
MACHINED DIMENSIONS
X. ±0.75
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M 1982

DATE 9-27-97
SCALE 1:2
DRN. T.WATANABE
CHK. K.Shibuya
APPD.

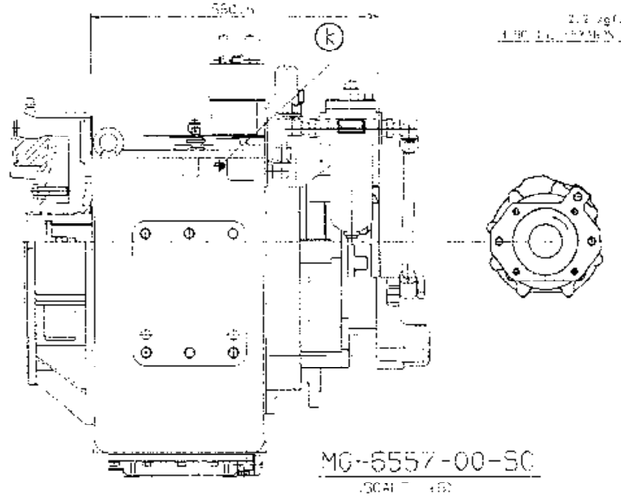
TWIN DISC INCORPORATED RACINE, WI 53403 - USA

5-49091

SHEET 1 OF 1 | REV ___

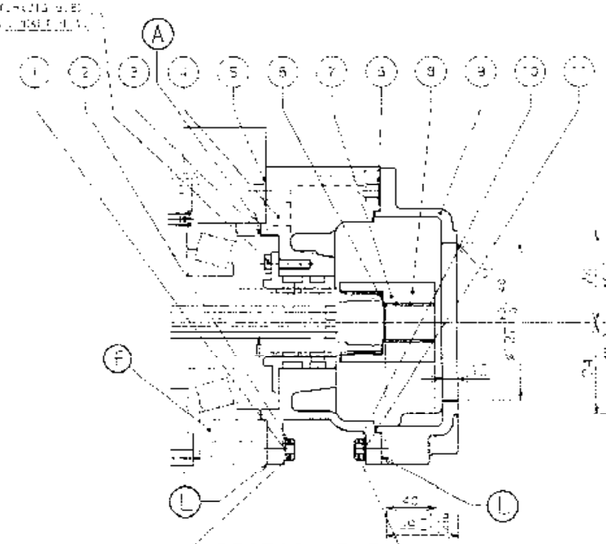
A2T

D C B A



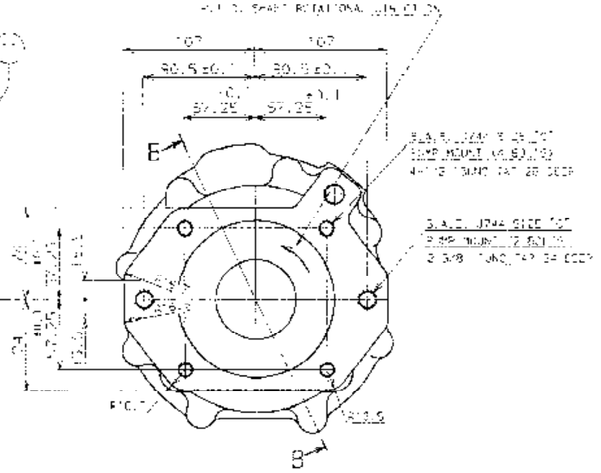
MG-6557-00-SC

SCALE 1 : 1

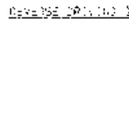


SECTION B-B

FIG 2



MASS ELASTIC SYSTEM



INPUT CHART			SLEEVE
D_1	L_1	d	L_2
0.50	0.150	0.218	0.00

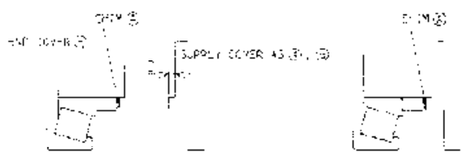
NOTES:
1. ALL VALUES WERE CALCULATED.
2. MASS ELASTIC DATA DOES NOT CONVERT TO ENGINE SPEED.

$I_{(1)}$ = MOMENT OF INERTIA ($lb\text{-}in^2$)
$C_{(2)}$ = TORSIONAL STIFFNESS (IN/radian)
d = MIN. SHAFT DIA. (IN)
$L_{(3)}$ = ACTIVE SHAFT LENGTH (IN)

DIRECTIONS FOR ADJUSTMENT WITH SHIMS
SHIMS MUST BE ADJUSTED BEFORE INSTALLING SUPPLY COVER AS.
BECAUSE TAPER ROLLER BEARING IS USED FOR THE DRIVE SHAFT, A GAP BETWEEN TAPER ROLLER BEARINGS IS ADJUSTED AS FOLLOWS TO BE +0.05/-0mm.

1. MEASURE THE DIMENSION "D" OF THE REMOVED SUPPLY COVER AS ③, AND SUPPLY COVER AS ④ WHICH IS USED IN THIS ALL.
2. WHEN THE DIMENSION "D" OF SUPPLY COVER AS ④ WHICH DOES INSTALLATION IS BIGGER THAN THE DIMENSION OF THE REMOVED SUPPLY COVER AS ③, TAKE SHIM ONLY THE DIFFERENCE.
3. WHEN THE DIMENSION "D" OF SUPPLY COVER AS ④ WHICH DOES INSTALLATION IS SMALLER THAN THE DIMENSION OF THE REMOVED SUPPLY COVER AS ③, PUT SHIM ONLY THE DIFFERENCE.

⑥	PART NO.	REQ.	THICKNESS
	M-6501-0203	1 SET	0.1 / 0.2 / 0.5 / 1.0 / 2.0 mm



ITEM	PARTS NO.	NAME	QTY	REMARKS
1	M-6501-0203	ASSY	6	
2	M-6501-0204	SPACER	6	
3	M-6501-0205	SHIM	SET	
4	M-6501-0206	SUPPLY COVER AS	1	
5	M-6501-0207	O-RING	6	
6	M-6501-0208	SLEEVE	1	
7	M-6501-0209	SLEEVE	1	
8	M-6501-0210	SUPPLY COVER AS	1	
9	M-6501-0211	COVER AS	1	
10	M-6501-0212	SCREW, HEX HEAD	6	
11	M-6501-0213	WASHER	6	

HYDRAULIC P.T.O. PUMP DRIVE SPECIFICATION		
TOTAL WEIGHT	APPROX. 7 LBS	
OIL VISCOSITY	SAE #10 JOINT USE MOTOR OIL	
P.T.O. CAPACITY	MAX. P.T.O. WORKING PRESS. 1500 PSI	
	P.T.O. OPERATING RPM 500 ~ 1000 PER	
	P.T.O. SHAFT ROTATION CW AS VIEW ROTATION	
	P.T.O. ACCEPTS O.A. 744 SIZE O-RING	
ENGINE DATA	GEAR	32/24
	NO. OF TEETH	24
	NOM. ROOT DIA.	29.630
	PRESS. ANGLE	30°
	TIP DIA.	22.94 +0.00 -0.02
	ROOT DIA.	3.785 +0.000 -0.010
	ARC TOOTH SPACE	3.345 +0.10 -0.10

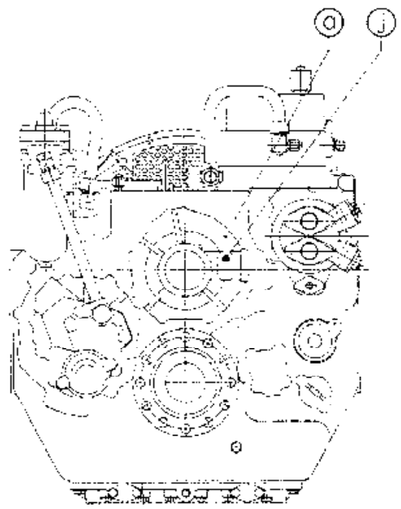
NOTE: PLEASURE IN THE DRAWING MEANS DIMENSION OF INSTALLED OR MAIN IMPORTANT PARTS.

NOTE: USED PACKING (THREEBOND #1211) ON THE PORTION MARKED Ⓒ AND Ⓓ ASSEMBLE TION.

1 SET OF SPACER ② FOR EACH SHAFT WITH SHIMS.
SPACER ② SHOULD BE 40.05 ± 0.05 mm.

MG-6557-00-A

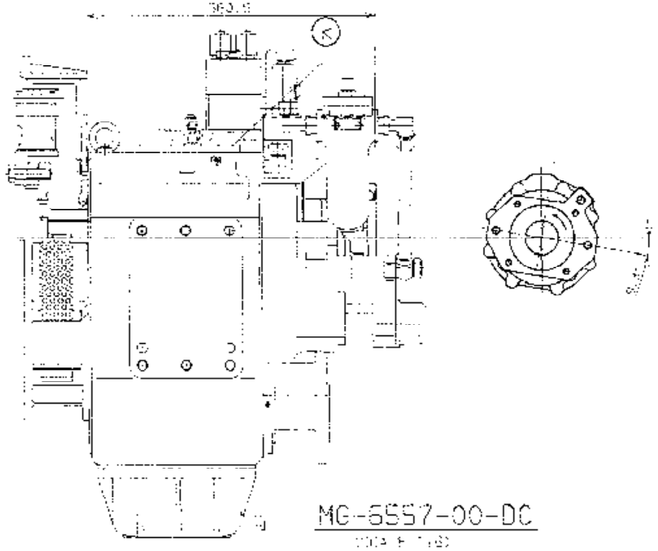
SCALE 1 : 1



BEFORE CHANGE

FIG 1

SCALE 1 : 1



MG-6557-00-DC

SCALE 1 : 1

OPTION KIT B.O.M. NO. 5Z03159

OF P.T.O. INSTALLATION PROCEDURE

PAY ATTENTION TO THE FOLLOWING ITEMS WHEN MODIFYING THE MARINE GEAR.

- THROUGHOUT THE INSTRUCTIONS, A CIRCLED NUMBER INDICATES A NEARLY REQUIRED PART AND A CIRCLED LETTER INDICATES A PART TO BE REUSED ON A MARINE GEAR PART.
- AS WELL AS PAYING ATTENTION SO THAT DIRT DOES NOT BECOME ATTACHED TO THE MACHINE OR PIPING, BEFORE THE INSTALLATION, WASH IN CLEANING OIL AND DRY WITH COMPRESSED AIR.
- ALTHOUGH THE PIPING HAS BEEN MANUFACTURED TO CONFORM WITH THE DIMENSIONS BETWEEN THE MACHINES, IF THERE IS ANY DISCREPANCY WHEN INSTALLING THE PIPING, LOOSEN THE INSTALLATION BOLTS AND READJUST THE POSITION BEFORE COMPLETING THE INSTALLATION.
- TIGHTEN THE INSTALLATION BOLTS SUFFICIENTLY SO THAT THERE ARE NO OIL LEAKS.
  OTHER INSTALLATION BOLT USE EXISTING BOLTS ARE SHOWN IN THE DRAWINGS.
- APPLY GREASE WHEN ASSEMBLING THE O-RING.

1. REMOVING THE MARINE GEAR WATER
   1) REMOVE THE S PULLY COVER AS ④ OF MARINE GEAR. LOOSE AT THAT TIME, MOUNT BOLT THE ADAPTER ⑦.
      THEN INSTALL THE ADAPTER ⑦ TEMPORARILY ⑧ SPACERS)
2. INSTALLATION OF P.T.O. PARTS
   REMOVE THREEBOND WILL BE APPLIED TO the SURFACE ⑦ TO WHICH THE SUPPLY COVER AS ④ AND COVER AS ⑨ WILL BE INSTALLED, ENSURE THAT IT IS CLEAN.
   1) BEFORE INSTALLING THE SUPPLY COVER AS ④, READ OUT THE SHIM SO THAT THE GAP IS 0.05 ~ 0.10 mm. (REFER TO FIG.2)
   2) APPLY THREEBOND (#1211) TO THE END COVER ⑨ TO WHICH THE O-RING ⑤ WILL BE ASSEMBLED, AND INSTALL THE SUPPLY COVER AS ④
   3) INSTALL THE SLEEVE PUMP ⑥ TO THE SPLINE OF THE DRIVE SHAFT.
   4) APPLY THREEBOND (#1211) TO THE SUPPLY COVER AS ④ TO WHICH THE O-RING ⑤ WILL BE ASSEMBLED, AND INSTALL THE COVER AS ⑨.

METRIC

THIRD ANGLE PROJECTION

SIMILAR TO

NOTICE: THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO MULLIFY OR LIMIT RIGHTS GRANTED TO THE U.S. GOVERNMENT OR OTHERS BY CONTRACT.

REV	BY	APPD.

REV	ZONE	CH. NO.	DATE	REV	ZONE	CH. NO.	DATE

MATERIAL

HEAT TREAT

SURFACE TREATMENT

WEIGHT XXXX lbs

FIRST USE
ENG. MG-6557-00-SC
MG-6557-00-A
MODEL MG-6557-00-DC

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MACHINE DIMENSIONS
X .X ±0.25
.XX ±0.13
.XXX ±0.13
ALL ANGULAR TOLERANCES BY GEOMETRIC TOLERANCING PER ANSI Y14.5M-1982

DATE 11-24-98
SCALE 1:1.0
DRN. M.SHIRAI
CHK.
APPD.
APPD.

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

NAME INSTALLATION DRAWING (LIVE PTO AS)

7-37004-A

SHEET 1 OF 1 REV ---

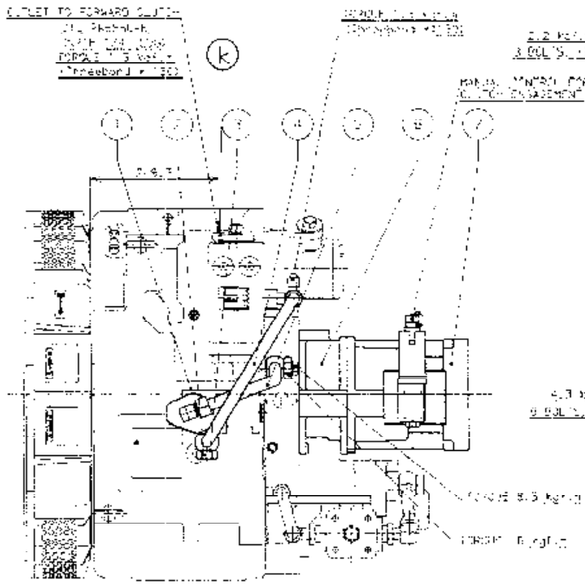
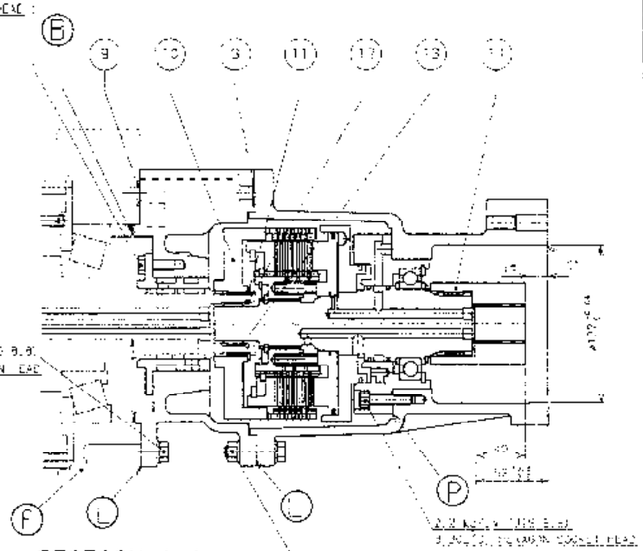
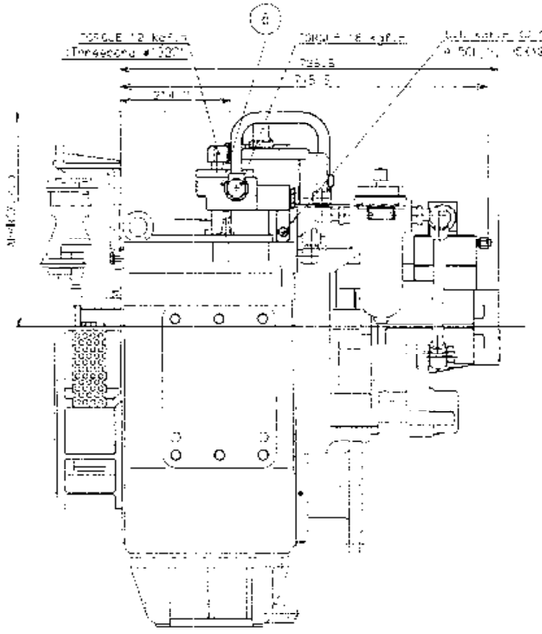
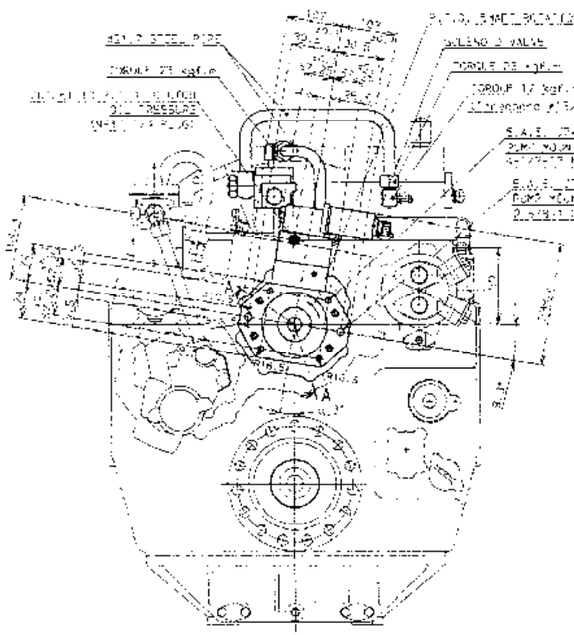


FIG.4

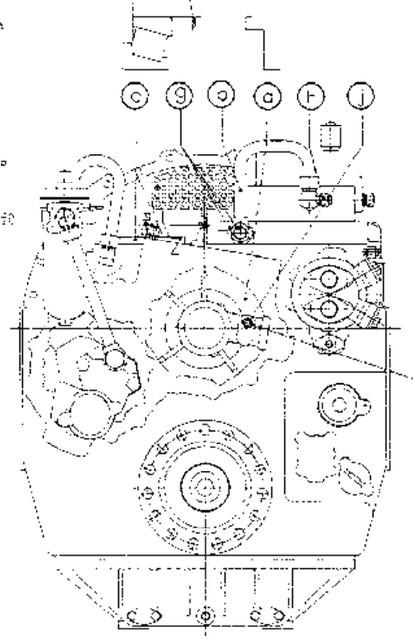


SECTION A-A FIG.3





COMPLETED VIEW



BEFORE CHANGE FIG.1

VIEW Z FIG.2

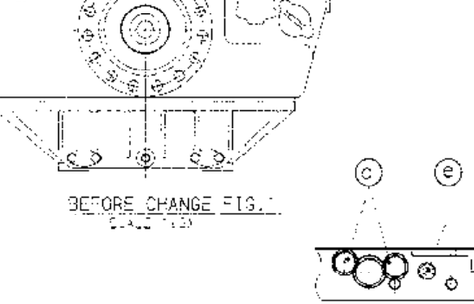
HYDRAULIC P.T.O. PUMP DRIVE SPETIFICATION

TOTAL WEIGHT	APPROX. 28 kg
OIL PRESSURE	10 kgf/cm² (142 lbf/in²) at RATED SPEED (at 1,750 r.p.m.)
OIL CAPACITY	2.5 ℓ (0.7 U.S. gal, 0.6 Imp. gal)
P.T.O. CAPACITY	MAX. P.T.O. WORKING TORQUE 61kgf-m P.T.O. OPERATING SPEED 600 ~ 1,750 r.p.m. P.T.O. SHAFT ROTATION SAME AS ENGINE ROTATION
MOUNTING SPECIFICATION	P.T.O. ACCEPTS S.A.E. J744 SIZE "D" FLANGE 6-8 x M10 STUD BOLTS
SPLINE DATA	DP 8/16 No. of teeth 14 Addendum 0.0625 in. Pressure angle 30° Pitch dia. 1.750 in. Root dia. 1.625 in. Major dia. 1.875 in.

CAUTIONS FOR ADJUSTMENT AND SHIMS

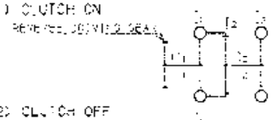
1. SHIM MUST BE ADJUSTED BEFORE INSTALLING SUPPLY COVER AS, BECAUSE TAPER ROLLER BEARING IS USED FOR THIS UNIT SHAFT. GAP BETWEEN TAPER ROLLER BEARINGS IS ADJUSTED AS FOLLOWS TO BE +0.05~+0.25mm.
   a. REMOVE THE DIS-KNOWN SET OF THE REMOVED SUPPLY COVER AS (A), AND MEASURE COVER AS (B), WHICH TRIES TO ADJUST.
   b. WHEN THE DIMENSION "L" OF SUPPLY COVER AS (B) WHICH DOES INSTALLATION IS BIGGER THAN THE DIMENSION OF THE REMOVED SUPPLY COVER AS (A), TAKE SHIM ONLY THE DIFFERENCE.
2. KEEP THE DIMENSION "L" OF SUPPLY COVER (B) WHICH DOES INSTALLATION IS SMALLER THAN THE DIMENSION OF THE REMOVED SUPPLY COVER AS (A), SET SHIM ONLY THE DIFFERENCE.

SHIM	PART NO.	QTY.	THICKNESS
(B)	M160306208	1 SET	0.1 0.2 0.5 1.0 2.0 (m/m)



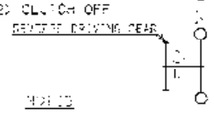
MASS ELASTIC SYSTEM

(1) CLUTCH ON



INPUT SHAFT				GEARING RATIO	P.T.O. SHAFT			SLEEVE
0.362	0.10	0.0049	0.0179	0.919	0.25	0.1258	0.035	0.0071

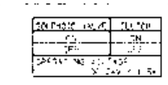
(2) CLUTCH OFF



INPUT SHAFT		GEARING RATIO
0.362	0.10	0.919

NOTES

1. ALL VALUES WERE CALCULATED.
2. VERTICAL PLANE DATA SHOW THE [illegible] ENGINE SPEED.
3. THE MOMENT OF INERTIA (kg-m²)
4. THE TORSIONAL STIFFNESS (kg-m/rad)
5. MIN. SHAFT DIA. (m/m)
6. APPLY SHAFT [illegible]



WIRING OF SOLENOID VALVE

NOTE

1. [illegible] FOR FOLLOWING ITEMS NOT [illegible] FOR MAIN IMPORTANT PO TS.
2. MAKE SURE [illegible] PAST PACKING.
3. SET [illegible] FASTENING (THREEBOND #1211) ON THE POSITION MARKED (L) AND ASSEMBLE THEM.
4. APPLY GREASE (G) FOR EACH SHAFT [illegible] SLIDING PARTS SHOULD BE 0.05 ~ 0.15 m/m.

OPTION KIT B.O.M. NO. 5Z03160

P.T.O. INSTALLATION PROCEDURE

USE THE FOLLOWING PROCEDURE TO MODIFY THE MARINE GEAR without P.T.O. ADAPTER TO THE MARINE GEAR WITH P.T.O. DRIVE.
PAY ATTENTION TO THE FOLLOWING ITEMS WHEN MODIFYING THE MARINE GEAR.

- * THROUGHOUT THE INSTRUCTIONS, A CIRCLED NUMBER INDICATES A REMOVED FIGURED PART AND A CIRCLED LETTER ONE INDICATES A PART TO BE PURCHASED OR A MARINE GEAR PART.
- * AS WELL AS PAYING ATTENTION TO THAT DIRT DOES NOT BECOME ATTACHED TO THE MACHINE OR PIPING, BEFORE THE INSTALLATION, WASH IN CLEANING OIL AND DRY WITH COMPRESSED AIR.
- * BECAUSE THE PIPING HAS BEEN MANUFACTURED IN THE WEB OF THE DIMENSIONS BETWEEN THE MACHINES (IF EQUIPPED) AND THE PIPING, WHEN INSTALLING THE PIPING, LOOSEN THE INSTALLATION BOLTS AND READJUST THE POSITION BEFORE COMPLETING THE INSTALLATION.
- * TIGHTEN THE INSTALLATION BOLTS SUFFICIENTLY SO THAT THERE ARE NO OIL LEAKS.
  (TIGHTENING TORQUE OF INSTALLATION BOLT TIGHTENING TORQUES ARE SHOWN IN THE DRAWINGS.)
- * APPLY GREASE WHEN ASSEMBLING O-RINGS.

THE FOLLOWING PART IS NECESSARY FOR THE MODIFICATION.

NAME	S.T.C.HANDLE STD ASS'Y	B.O.M.NO.
DRAWING NO.	7-37057-B	5Z03160

1. REMOVING THE MARINE GEAR PARTS
   1) REMOVE THE SUPPLY COVER ASSEMBLY (A), PIPE (E), AND COVER (C).
      REFER TO P.T.O. 2 WHEN REMOVING THE SUPPLY COVER ASSEMBLY (A), ALSO REMOVE THE GEAR (F).
   2) INSTALL THE REMOVED ADAPTER (J) AT POSITION (K) ON HOUSING.
      SECURE TO TIGHTEN.
      WHEN REMOVING THE COVER (C), PAY ATTENTION SO THAT THE INSTALLATION BOLT DOES FALL INTO THE MARINE GEAR.
      ALSO, DRILL THE PIPE PARTS (D) AND (E) WILL BE USED LATER, ENSURE THAT THEY ARE NOT DIRTY.
   3) REMOVE THE BOLT, WASHER (G) AND PLUG (H) FROM THE VALVE ASSEMBLY (B) INSTALLATION SURFACE (VIEW Z).
2. INSTALLING THE P.T.O. PARTS
   BEFORE THREEBOND WILL BE APPLIED TO THE SURFACE TO WHICH THE SUPPLY COVER ASSEMBLY (A) AND P.T.O. SUB-ASSEMBLY (D) WILL BE INSTALLED, ENSURE THAT IT IS CLEAN.
   1) BEFORE INSTALLING THE SUPPLY COVER ASSEMBLY (A), READJUST THE SHIM SO THAT THE GAP IS +0.05 ~ +0.25mm. (REFER TO FIG.3)
   2) APPLY THREEBOND (#1211) TO THE END COVER (C) AS SHOWN IN (VIEW Z) FIG.2 AND INSTALL THE SUPPLY COVER ASSEMBLY (A).
   3) INSTALL THE DRIVING RING (2), SNAP RING (1) AND BEARING (3) AND THEN SNAP RING (2) TO THE GROOVE OF THE DRIVE SHAFT.
   4) APPLY THREEBOND (#1211) TO THE SUPPLY COVER ASSEMBLY (A), AND INSTALL THE P.T.O. SUB-ASSEMBLY (D). MOVE DRIVING RING (2) BACK AND FORTH, TURN SHAFT SO THAT THE FIBER PLATE COMPLETELY ENGAGES WITH THE DRIVEN RING, AT THIS TIME, IF THE P.T.O. SUB-ASSEMBLY IS NOT COMPLETELY PAY ATTENTION SO THAT NO ACCIDENT IS HAD CAUSED BY PARTS FALLING DURING THE INSTALLATION.
   5) INSTALL THE SLEEVE PUMP ASSEMBLY (G).
3. VALVE ASSEMBLY INSTALLATION
   1) INSTALL THE VALVE ASSEMBLY (B) TOGETHER WITH THE GASKET (I) TO THE SURFACE OF THE SPACER (FIG. 2).
      INSTALL THE GASKET AFTER REMOVING THE MOISTURE ON THE CONTACTING SURFACES.
   2) APPLY THREEBOND (#1211) TO THE COVER (C) WHICH WAS REMOVED IN ITEM (1) AND INSTALL IT.
   3) INSTALL THE PIPE ASSEMBLY (E) WITH THE JOINT SCREW (J) AND GASKET COPPER (K).
      IN THE SAME WAY, INSTALL THE PIPE ASSEMBLY (D) WITH THE JOINT SCREW (J), GASKET COPPER (K) AND ADAPTER (L) WHICH ARE REMOVED IN ITEM (1).
4. OPERATION CHECK

AFTER THE INSTALLATION, CHECK THE OPERATION WITH THE FOLLOWING PROCEDURE.

1) CONNECT THE PUMP TO THE PTO SHAFT.
2) CONNECT A 50 kgf/cm² PRESSURE GAUGE TO THE PTO CLUTCH OIL PRESSURE OUTLET.
3) TURN THE NUT OFF AND CHECK THAT THERE ARE NO OIL LEAKS.

CONTROL VALVE	CLUTCH
ON	ON
OFF	OFF

OPERATING OIL PRESSURE 20 kgf/cm²

REV	BY	APPD

REV	ZONE	CN. NO.	DATE	REV	ZONE	CN. NO.	DATE

NOTICE! THIS PRINT CONTAINS PROPRIETARY INFORMATION AND IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO THE INTERESTS OF TWIN DISC, INCORPORATED RACINE, WI 53403 - USA
THIS NOTICE IS NOT INTENDED TO WAIVE OR LIMIT RIGHTS (RESERVED TO THE U.S. GOVERNMENT BY OTHERS BY CONTRACT.

MATERIAL: XXXX kg
HEAT TREAT:
SURFACE TREATMENT:
2 PROP USE
NEXT:
MODEL MGM-6028A-DD-DC
NAME: INSTALLATION DRAWING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE m/m
MACHINED DIMENSIONS
X ±0.25
X.X ±0.25
X.XX ±0.13
ALL ANGULAR TOLERANCES ±1°
GEOMETRIC TOLERANCING PER ANSI Y14.5M-1982

DATE: 8-23-88
SCALE: 1/2.5
DSN:
CHK:
APPD:

TWIN DISC INCORPORATED RACINE, WI 53403 - USA

HYDRAULIC DIAGRAM
3-49460-C

7-37064-B

SHEET 1 OF 1 REV ---

METRIC
THIRD ANGLE PROJECTION
SIMILAR TO

#1020825 04/04

TWIN DISC, INCORPORATED RACINE, WISCONSIN 53403, U.S.A. 262-638-4000/262-638-4482 (FAX) WWW.TWINDISC.COM